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Monterey, California

THESIS

FEASIBILITY AND REQUIREMENTS ANALYSIS OF MIS FOR OPERATIONAL PATROL SQUADRONS IN THE UNITED STATES NAVY

by

Carl P. Norton
and
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December 1981

Thesis Advisor: Norman R. Lyons

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Feasibility and Requirements Analysis of MIS for Operational Patrol Squadrons in the United States Navy

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December 1981

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ABSTRACT

The feasibility of a computer based Information/Training Support System for Operational Patrol Squadrons is examined in detail. The historical development and evolutionary trends of such a system are reviewed, current initiatives and projects are explained and evaluated, and user requirements are analyzed in order to make recommendations for future development. The Aviation Training Support System (ATSS), Naval Aviation Logistics Command Management Information System (NALCOMIS), and proposed Portable Logistics System (PLS) are cited as possible developmental paths for future systems. These paths are evaluated in terms of Patrol Squadron requirements, and are presented, either singularly or in combination, as feasible alternatives. This thesis serves as a comprehensive reference for decision makers involved in systems development within the United States Navy Patrol Aviation Community.

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I. INTRODUCTION

The United States Navy Patrol Aviation (VP) Community has, for the last 40 years, been a vital and viable force in the defense of the nation. It has grown from the days of the PBY or "Catalina" scout aircraft, to a present characterized by highly capable, technically sophisticated "Submarine Killers". The operational complexity, and therefore the management of these operations, has also become significantly more difficult to comprehend.

Within the Naval Air Force, Maritime Patrol Forces are accountable to two major commands. Commander Patrol Wings Atlantic has two active Wings consisting of six squadrons each, a number of Reserve squadrons, and a Fleet Replacement Squadron (FRS). Commander Patrol Wings Pacific has essentially the same make-up. The active Atlantic Fleet units are home-ported in Brunswick, Maine and in Jacksonville, Florida, with the Replacement Squadron also located in Jacksonville. The Pacific Fleet units are located at Moffett Field, California, and at Barbers Point, Hawaii, with the Replacement Squadron at Moffett Field.

The primary mission of these commands is Antisubmarine Warfare (ASW), with an additional number of major responsibilities, including:

Surveillance, Mining, Anti-Shipping, Communications, Intelligence, and Search and Rescue. All Patrol Squadrons currently fly the P-3 "Orion" aircraft in various evolutionary models. The newest model currently in the Fleet is the P-3C Update II. Built by Lockheed, it is accepted throughout the world as the finest Patrol aircraft available.

Current Patrol Community operations are carried on worldwide at a number of deployment sites. Atlantic Fleet locations are Keflavik, Iceland; Bermuda; Lajes, Azores; Rota, Spain; Sigonella, Sicily; and a number of temporary detachment fields. Pacific deployment sites currently include Adak, Alaska; Cubi Point, Phillipines; Kadena, Okinawa; Misawa, Japan; Guam; and Diego Garcia in the Indian Ocean.

The cost of the diverse services of the Patrol Community has recently run at about one percent of the Navy's annual expenditures. [Ref. 1] In terms of personnel, each squadron's complement is about 360, of which roughly 140 are aircrewmen. When combined with Patrol Wing staffs, Naval Air Station personnel and facilities, Aviation Intermediate Maintenance Departments (AIMD), and Antisubmarine Warfare

Operations Centers (ASWOC) at each deployment site, it becomes very clear that the Navy's commitment to this endeavor is far-reaching and permanent.

Due to the importance of the community, especially the individual Patrol Squadrons, it is essential that those in positions of leadership within the community strive to attain and maintain a level of managerial control that is on the same technological plane as the systems and procedures employed by the operational units. This ideology is certainly not new, nor is it without precedent. Within the Naval Air Force, as early as 1972, computer-based management information and control systems were being introduced into the operational Navy. [Ref. 2] Much has been learned in the past decade concerning the applicability of automated systems to the managerial process. Significant gains have been made in discrete areas, such as automated training support, but individual commands have been greatly ignored, or at least disregarded, due to a complex set of circumstances. Happily, conditions affecting systems development are not static, and may, in the presence of current initiatives, yield beneficial new capabilities for the units that are currently in need. Unfortunately, at the present time, these initiatives do not include support for individual Patrol Squadrons.

The purpose of this thesis is to examine this situation in detail, within the framework of a system feasibility/requirements review, and in doing so, provide decision makers with the detailed justification for severely needed operational capabilities.

Chapter Two includes a comprehensive, historical background of computer-based information/training support systems in the Naval Air Force. Current initiatives are also reviewed, providing up-to-date information for discussion and analysis.

Chapter Three examines the political and regulatory environment that exists for systems development in Naval Aviation. Recent System Audit Reports are utilized to illustrate specific considerations applicable to patrol squadron systems.

Chapter Four provides an in-depth view of patrol squadron operations and managerial organization and procedures. This chapter serves to develop justification of need, by citing informational deficiencies.

Chapter Five redefines the deficiencies and needs established in Chapter Four in terms of patrol squadron requirements. These functional requirements are developed and discussed, and contrasts are drawn to other communities. Alternatives which meet the requirements are developed and compared to systems currently in use or in development, in order to determine to what extent the current environment satisfies the unique needs of Patrol Squadrons, and to provide decision makers with a clear picture of the current situation.

Chapter Six concludes the thesis by drawing conclusions from the discussion and analysis performed, and by making recommendations based on those conclusions.

II. BACKGROUND

The basic need for management information systems in the Patrol Aviation community was cited in the introduction to this paper. This chapter surveys the development of ADP and MIS in the aviation community and provides an overview of projects in development at this time.

A. VERSATILE TRAINING SYSTEM (VTS)

The birth of management information systems in the Naval Aviation community started with the conception of the Versatile Training Support System. The original concept of VTS was that of an automated training support system oriented solely toward training enlisted Naval Aviation personnel to perform maintenance on aircraft.

Prior to the installation of the prototype VTS at NAS Lemoore, California in 1972, the assignment, training, and utilization of all enlisted aviation maintenance personnel assigned to the A7-E Fleet Replacement Squadron, VA-127, was done manually. Consequently, the determination of billet assignment and the specific training necessary to fully qualify 1,000 students annually to fill a specific billet required an enormous amount of manual record keeping and continous administration. [Ref. 3] This manual process of training administration thus resulted in the occasional loss or misplacement of some personnel resources during the assignment, processing, and training period. The tasks rerquired to accomplish training demanded the services of many qualified Training Coordinators and numerous man-hours. All rosters, muster lists, schedules, letters, and forms necessary in the training cycle had to generated manually.

The initial VTS was procurred through a competitive contract as a turnkey training device under the end-item clause of Defense Acquisition Regulations 3.1100.1(a) and SECNAVINST 5236.1a, par 1.b.2.d. [Ref. 4] In essence, these regulations state that general purpose, commercially available ADP components and the equipment created from them, regardless of use, size, capacity, or price, are under the approval authority cited in the instructions. They also state specific types of automated data processing equipment (ADPE) which are exempt from the stated approval authority and requirements. VTS uses standard off-the-shelf ADPE but was exempted from the ADPE approval requirements by the Chief of Naval Material and was designated solely as a training device.

The initial configuration of the VTS at NAS Lemoore was designed and installed to support the A-7 FRAMP Enlisted Organizational ("O") level training program. After test, evaluation, and acceptance of the Lemoore VTS system, the second installation was authorized for NAS Cecil Field, Florida. The original concept of supporting only the "O" level training was expanded for Cecil Field's Aircraft Intermediate Maintenance Department (AIMD). After user acceptance of the Cecil Field installation, the third and fourth installations were to support the A6-E enlisted organizational and intermediate level training programs at NAS Oceana, Virginia, and at NAS Whidbey Island, Washington.

Continued user satisfaction and acceptance of the Versatile Training System has resulted in sixteen sites installed or being installed at Naval Air stations. In addition, the subsurface community uses a variant of the original VTS to support their own unique training requirements.

In the Naval Aviation community, what was once known as the Versatile Training System, is now known as the Aviation Training Support System, or ATSS. The change was initiated to distinguish between the training support system providing service to NAVAIR funded activities and the system utilized by the subsurface community which still uses the VTS designation.

B. AVIATION TRAINING SUPPORT SYSTEM (ATSS)

The Aviation Training Support System is virtually the same as the VTS discussed previously. By direction of the CNO, the Aviation Training Support System was designated as the standard Fleet Replacement Squadron (FRS) training support system at Naval and Marine Corps Air Stations. As such, the ATSS has been installed at the following locations:

** Fleet Replacement Squadron Activities:

* NAS Lemoore
* NAS Cecil Field
* NAS Oceana
* NAS Whidbey Island
* NAS Miramar
* NAS Jacksonville
* NAS Moffett Field
* NAS North Island
* NAS Brunswick
* NAS Barbers Point

** Planned Chief Naval Air Training Activities

* NAS Corpus Christie

* NAS Whiting Field

* NAS Beeville

* NAS Kingsville

* NAS Meridian

* NAS Pensacola

This section will describe the major responsibilities and program managers for the Aviation Training Support System, system objectives, and the hardware and software used in the ATSS.

1. Program Manager and Responsibilities

Naval Air Systems Command (code 4135H) is the program manager for Naval Air Stations and NAVWEPCEN, China Lake under the sponsorship of the head, OPNAV Aviation Technical Training Branch (OP-592). [Ref. 5] NAVAIR responsibilities as program manager include preparation, review, justification, and defense of budget and apportionment estimates for the ATSS program. Total funding for the ATSS through 1985 is 29.5 million. [Ref. 4]

NAVWEPCEN, code 3109, is the ATSS Program Manager responsible for the technical development and implementation of the ATSS program.

The Naval Training Equipment Center (NTEC), Orlando, Florida, (code N-43), is responsible for providing long term logistic support.

The principal users of the Aviation Training Support System are the Naval Training Command, Fleet Replacement Squadrons, Naval Aviation Maintenance Training Group Detachments, Naval Air Station AIMD's, and limited usage by Operational Squadrons during their at-home cycle.

2. System Objectives

The primary objective for the ATSS is to improve the match of total training resources to the student training rate in an efficient and cost effective manner. To accomplish its primary objective, the Aviation Training Support System was designed to accomplish the following: [Ref. 6]

A. Determine and select the best possible billet for each enlisted man based on his individual capabilities, prior experience, and training.

B. Tailor an individual's training by comprehensive testing (i.e., diagonostic, pre and post test, PQS, CDI, QAR, NATOPS, etc.) individualized prescription, and path specification.

C. Provide individualized instruction under Instructional Systems Development (ISD) guidelines.

D. Enable a course manager to author, edit, review, and update training materials on-line.

E. Schedule training resources (aircraft, simulators, maintenance trainers, personnel, etc.) to meet total training requirements and priorities.

F. Schedule the training to minimize consumption of resources.

G. Provide instructors, training coordinators, quota control personnel, and supervisors with current training progress and future training needs.

H. Provide on-line quota control capabilities required to support officer and enlisted personnel training for all operational squadrons.

I. Prepare all training correspondence and personnel training data required.

J. Permit consideration of the effect of a decision in advance by supplying complete, accurate, and timely training data for use in the planning and decision making process.

K. Eliminate from the planning and decision making processes the problems associated with the use of inconsistent training data by providing a means of preparing and presenting training information in a complete, comprehensive manner.

L. Identify, structure, and quantify significant past relationships and forecast future trends based on training information.

M. Merge resource and production data to produce significant measures of training performance, facilitate control of costs, and facilitate training decisions with minimum processing of data.

N. Recognize the needs at all training levels so that the requirements of each are met with minimum duplication.

O. Reduce the time and volume of information required to make training decisions by reporting to each level only the exception from the standard norm.

P. Prepare an individualized training program for each aircrewman after comparing his training history with a standard training syllabus and allowing for Training Officer modifications. This sylabus consists of a list of tasks the aircrewman is to perform in a satisfactory and timely manner.

Q. Assist the Schedules Officer in scheduling the aircrewman in those assigned events and predict a training completion data.

R. Interact with Resource Configuration and Scheduling (RCAS) software, which has information regarding resource availability and status.

5. Generate student gradebooks to track each aircrew member's progress through the sylabus.

3. ATSS Hardware

The specific hardware configuration at any one ATSS site varies according to the number of activities that it is supporting. All ATSS hardware is Commercial Off-the-Shelf (COTS) equipment and is centered around the Digital Equipment Corporations (DEC) PDP-11 family. A typical hardware configuration for an ATSS site is described below and illustrated in Figure 1: [Ref. 5]

* PDP 11/70 Central Processor with 2K bytes of Cache Memory and 256K bytes of Parity Core or MOS Memory, Memory Management, Bootstrap/Diagnostic Loader, and Line Frequency Clock.

* Programmable Asynchronous 16-line multiplexor with modem control. Up to eight multiplexors can be interfaced with the CPU to provide service to 64 interactive display terminals.

* Console terminal teletype (ASR 33 Teletype) or Hard-Copy printer (LA36 DECwriter 11). Both units contain a printer and keyboard. The teletype also includes a paper-tape reader and punch.

* Disk Drive Controller.

* Disk Drives (2). Disk drives have a formatted disk capacity ranging from 88 to 176 megabytes, depending on the type.

* Magnetic Tape Control Unit.

* Nine-Track Magnetic Tape Transport.

* High-Speed Printer. Printer produces up to 132 columns of hard-copy output at a rate of 300 to 900 lines per minute using either a 64 or 96 character drum.

* Lab Peripheral System.

* Alphanumeric, Serial, Hard-copy Printer Terminals. Printer terminal allows 132 column line to be printed at 30 characters per second and accepts one to six part forms from 3 inches to 14-7/8 inches in width.

* Alphanumeric CRT Terminals (up to 64). Normally ADM-3A dumb terminals.

* Intercomputer Communications System.

* 256K bytes of additional parity/MOS memory.

4. ATSS Software

ATSS software can be classified as System Support Software and Aviation Applications Software and each will be discussed seperately.

a. System Support Software

ATSS utilizes the DEC RSTS/E operating system. It allows multiple users to interact with the system and its data structures. RSTS/E can support up to 63 users simultaneously processing data using the BASIC-PLUS, COBOL, BASIC-PLUS-2, FORTRAN IV, APL, or RPG 11 language processors. The ATSS system utilizes BASIC-PLUS and BASIC-PLUS-2 extensivly although it is also capable of supporting FORTRAN and COBOL.

RSTS/E includes a comprehensive set of system utilities for the system manager and timesharing user. It can support line printer spooling and execution of up to eight batch jobs. [Ref. 7]

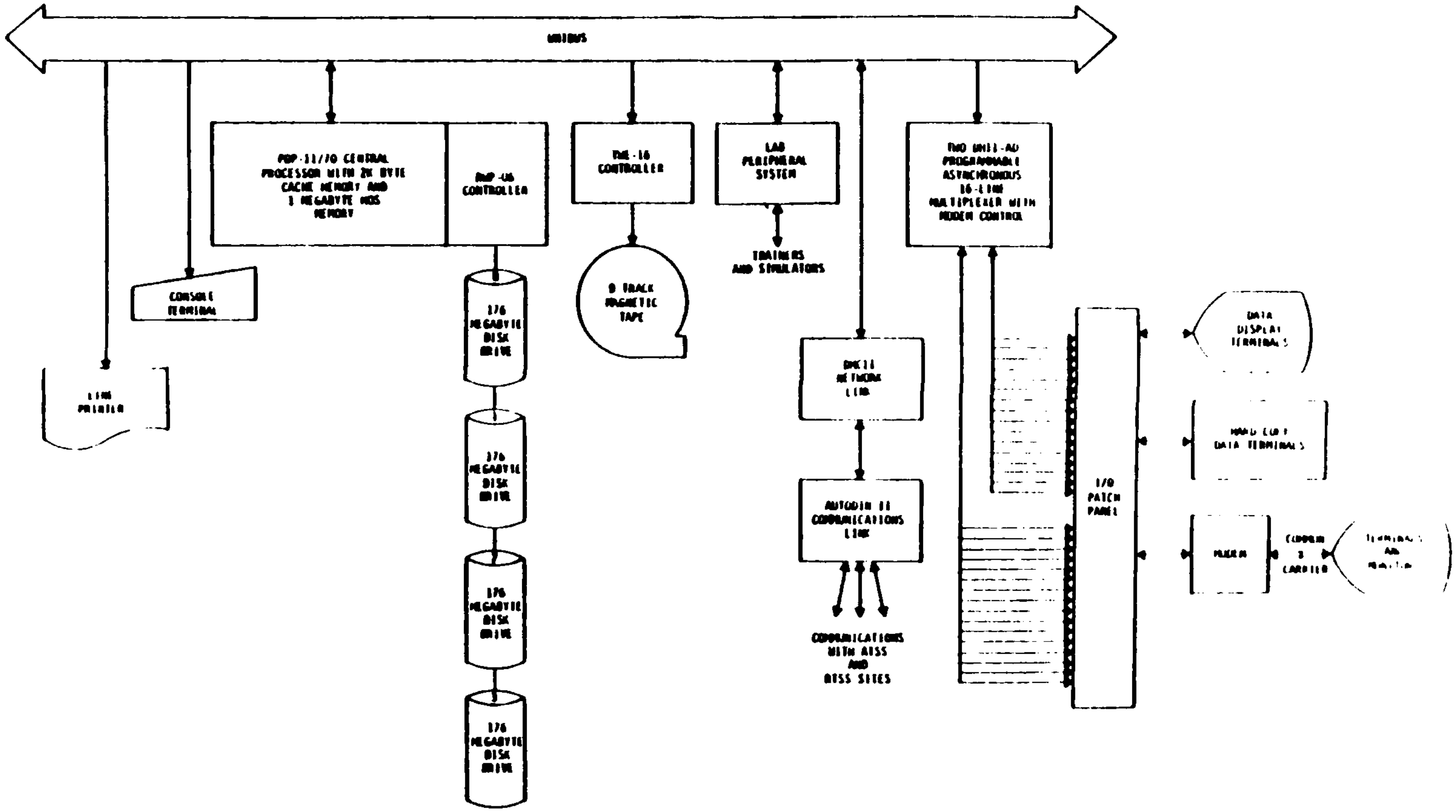


Figure 2.1 ATSS Hardware Configuration

The RSTS/E operating system dynamically allocates processor time, memory space, file space and peripherals to best accomodate changing work loads. It allows jobs to run one at a time until it either enters an I/O state or exhausts its time quantum that was assigned to it by the system or the system manager. After a job becomes stopped, the scheduler finds the next job that is ready and begins to run that job while interrupt driven device handlers are processing requested data transfers.

RSTS/E attempts to keep memory filled with as many jobs as possible. If a job that is to be run is larger than the available memory, the system transfers some jobs out of memory to a temporary swap file until it is their turn to run again.

The RSTS/E file system provides a wide range of on-line processing capabilities. Files can be accessed randomly or sequentially through BASIC-PLUS, or through the RMS-11 (Record Management Services) subsystem. Single and multi-key ISAM is optionally available with RMS-11K software. [Ref. 7] Files can be created, updated, extended, or deleted interactivly from the user's terminal or under program control. Files are protected from access on an individual, group, and system basis. Files can also be accessed by many users while being updated on-line. Back-up of files can be done either selectivly or totally and can be accomplished on-line without disrupting users, or offline.

b. Aviation Application Software

All ATSS application software is written in modular form to facilitate new requirements and program changes. The application software that is used by FRS squadrons consists of thirteen modules or subsystems described in the following paragraphs. [Ref. 5]

(1) Personnel Subsystem. The Personnel subsystem provides computerized personnel record support by enabling users to create, update, delete, or review computerized personnel records for individuals in the user's activities. This subsystem also produces assorted output listings such as recall bills, precedence lists, security clearance lists, billet assignment lists, prospective gain and loss reports, and work center manning and training deficiency lists. At the present time, this subsystem is one of the most widely used amoung operational VP squadrons during their at-home-cycle.

(2) Training Resource Scheduling Subsystem. This subsystem maintains an inventory of all training resources and their location and facilitates the scheduling and usage of all training resources. It also produces such reports as a Weekly Training Schedule, Instructor Qualification and Availability File, Resource Utilization List, etc.

(3) Personnel Scheduling Subsystem. The Personnel Scheduling subsystem allows either automatic scheduling of personnel for all classes specified in a particular curriculum or allows manual scheduling to personally tailor an individual's curriculum to meet a specific need. It also contains a module to produce the following outputs:

* Watch Lists
* Weekly Student Schedules
* Class Musters
* Training Coordinators-Student Schedules
* Training Completion Letters

(4) Test and Evaluation Subsystem. The Test and Evaluation subsysytem (TEVS) is an automated test item management system designed to enable users to create,

verify, and administer a test question data base. It also has the capability to print tests and associated answer keys, as well as utilize an automatic scoring system called the Test Input Device (TID). The on-line capability of this subsystem allows immediate feedback to the accuracy of a response and then provides the student a presentation of missed questions along with a list of suggested readings. TEVS also provides instructors with statistical data on the test questions themselves and allows upgrading of the test question bank or changes in the method of presentation.

(5) Training Track Subsystem. The Training Track subsystem provides for the creation and management of courses and events for the varied numbers of curriculum that are necessary to train the various types of students at a FRS. It allows the user to define the curriculum for the students and to select the billet for enlisted students. It also allows the user to obtain a Squadron Manning Report that lists all billets the Squadron has available and the individuals filling those billets.

(6) Gradebook Subsystem. The Gradebook subsystem provides an automated gradebook management system in which student progress and scheduling information is

kept. It also allows the user to update and manage computerized student gradebooks. The outputs from this subsystem are as follows:

* Gradebook Review
* Gradebook Survey
* Class Gradesheet
* Student Progress Summary
* Individual Event Progress Summary
* Gradeslips
* Training Readiness Report
* Event Disposition Summary
* Flight Event Disposition Breakdown

(7) Flight Data Management Subsystem. The Flight Data Management subsysystem consists of four modules that allow for automation of numerous forms and reports that are required for the management of flight data.

The Naval Flight Record (Yellow Sheet) Management module allows users to create a computerized yellow sheet record as well as updating, reviewing, or deleting existing records in the data base. The data items entered in the computerized Yellow Sheet are sent automatically to other ATSS subsystems for file update purposes. RCAS software utilizes A/C bureau number, A/C type, and engine times for update of component records. IFARS data is taken directly from this module and automatically converted to the format used in the required report.

The Logbook Management Module allows the user to manage and report necessary flight statistics for each aircrew member. Career, fiscal year, and monthly statistics are maintained current to the last day of the previous month. The following outputs are created by this module.

* Yellow Sheet Transmittal Report
* Daily Flight Activity Log
* Officer Monthly Activity Log
* Daily Aircraft Log
* Monthly Aircraft Report
* Aircrew Monthly/Yearly Flight Time
* Aircrew Monthly/Yearly Activity Sheet
* Yellow Sheet Data entry Status and Error Reports
* Average Monthly Sortie Report

The Multiple Sort module is a report formatter that allows the user to generate a report with any of the above information specified.

(8) RCAS Subsystem. The Resource Configuration and Scheduling subsystem (RCAS) consists of several modules designed to provide continous monitoring of aircraft, simulator, and trainer configuration and status. It allows the user to match the training resource to the type of training needed and provides for scheduling and management of maintenance related actions for all training resources. The following outputs are generated by the RCAS subsystem:

* A/C Accounting and Status Reports
* SDLM Scheduling
* Engine Accounting and Status Reports
* Technical Directive Compliance Reports
* Configured Item Usage and Screening Reports
* Training Event/Aircraft Subsystem Requirements Lists

(9) Issue Subsystem. The Issue subsystem manages and acccunts for the vast numbers of training materials necessary to train a large number of personnel. Library items (manuals, specifications, texts, etc.) and equipment (motion picture projectors, slide-tape systems, video players, etc.) accounting is automated to insure maximum utilization is maintained. VP-31, the FRS at Moffet Field, Calif. utilizes bar code readers and bar coded I.D. cards to facilitate this process.

(10) Weapons Platform Tracking Subsystem. This subsystem records and stores information pertinent to weapons delivery tactical training. Bomb and rocket delivery statistics indicate the success or failure of the student and the training received. This subsystem is more applicable to Fighter and Attack aircraft communities but could be modified to include torpedo delivery statistics for the P-3 community.

(11) Query Subsystem. The Query subsystem allows users to create and format reports that can access any desired data file (within security constraints) from the ATSS data base. It consists of two functions; Commands and Specifications. Commands allow the user to tell the subsystem what to do and Specifications allow the user to specify how the output is to be organized, what is desired in the output, and how it is to be displayed.

(12) PQS Subsystem. The PQS and Qualifications Management subsystem facilitates the tracking of an individuals PQS progress and generates exception reports for individuals who have expired or are about to expire a required recurring qualification. It also interfaces with other subsystems and automatically updates PQS records from training events and records.

(13) NITRAS Subsystem. The NITRAS subsystem provides the Chief of Naval Education and Training with the automated capability to manage and support the total Navy training effort. Three modules comprise the NITRAS subsystem; Master Course Reference, Student Master, and Training Summary. These modules are designed to provide a summary of all training managed by the ATSS system and are delivered to CNET on mag tape.

5. ATSS Summary

The Aviation Training Support System was designed solely to support Aviation Training Commands and Fleet Replacement Squadrons in their training effort. The applications that have evolved since its inception have lent themselves to other areas besides training but governing constraints and regulations have prohibited the expansion of ATSS outside the training environment.

Operational squadrons have been allowed to utilize the ATSS on a limited basis. For example, Operational Patrol Squadrons, upon return from deployement, are loaned one dumb terminal (ADM-3A) from the FRS, and this constitutes their sole interface with the system. All printers, storage devices, and processors are maintained at the FRS, which is usually located some distance away from the Operational Patrol Squadron spaces.

Applications run by Operational Patrol Squadrons are limited in regards to the total capabilities of the Aviation Training Support System. Generally, the squadrons utilize the personnel subsystem and create Officer and Enlisted personnel rosters, crew lists, recall bills; etc., but are reluctant to automate other currently manual functions because of the lack of resources, and the necessity to convert back to manual procedures when the squadron deploys.

C. NALCOMIS

The Naval Aviation Logistics Command Management Information System (NALCOMIS) is currently a program sponsored by the Chief of Naval Operations (CNO Codes OP-51 and OP-52) and is under the direction of the Naval Air Systems Command. Module 1 of NALCOMIS is designed to provide a modern Management Information System at the Organizational Maintenance Activity (OMA), Intermediate Maintenance Activity (IMA), and Supply Support Center (SSC) to support the Naval Aviation Maintenance Program (NAMP). NALCOMIS is defined as "an automated management information system which will provide aviation maintenance and material managers with timely, accurate and complete information on which to base day-to-day decisions through: a single, integrated, real-time automated system to provide timely support to aviation maintenance and supply workers, supervisors and managers, and automated source data entry devices for simplifying and improving data collection." In addition it is designed to provide "a means to satisfy the Naval Aviation Maintenance Program requirements, and data inputs to, and or interface with, other major Integrated Logistic Support (ILS) Systems in the Naval Aviation Logistics Community". [Ref. 8] As indicated above, NALCOMIS Module 1 is designed solely for MIS support of OMA, IMA, and Supply Support Center maintenance activities at both ship and shore sites.

1. History of NALCOMIS

NALCOMIS is the culmination of an evolutionary process which has taken place in the naval aviation community. Several projects and programs have been conducted over the past decade in an attempt to improve aircraft readiness and availability. The following describes the major projects/programs which have resulted in the NALCOMIS Program.

The Carrier Aircraft Maintenance Support Improvement Project (CAMSI) was established by the Chief of Naval Operations in 1970 with the purpose of identifying priority actions which would improve carrier aircraft readiness. Two of the significant findings of that project were: [Ref. 9]

1. Improved readiness could be achieved through increased efficiency in management of functions associated with shipboard aircraft maintenance and support.

2. The most pratical and cost effective means of attaining an essential level of efficiency in those functions would be through improved use of Automated Data processing equipment (ADPE).

In 1972 the Shipboard Aviation Command Management Information System (SACOMIS) was initiated as a project. SACOMIS was supported jointly by the Naval Air Systems Command and the Naval Supply Systems Command with regard to ADP policy and procedures, and respective maintenance and supply policies and procedures, with HQMC representation for Marine aviation matters. A detailed task effort was undertaken by a working group comprised of the Management System Development Office (MSDO) and Fleet Material Support Office (FMSO). In March 1974, CNO (OP-91) gave concept approval to the SACOMIS ADS plan. CNO (OP-51) directed that the SACOMIS program be expanded to include Naval Air Stations, Marine Aircraft Groups (MAGs), LPHs, LHAs, and

Marine Corps Air Stations under the new program titled NALCOMIS. A draft of the NALCOMIS ADS Plan was completed in September 1975 and as a result of review by appropriate Navy/Marine Corps Headquarters Components staffs, a decision was made to limit the scope of the initial endeavor to the support of Organizational Maintenance Activities, Intermediate Maintenance Activities, and Supply Support Center functions. By memorandum from Vice Chief of Naval Operations (VCNO) on 10 June 1976, the CNO designated NALCOMIS a program in accordance with OPNAVINST 5000.42A. The Assistant Secretary of the Navy (Financial Management) approved the proposed NALCOMIS Module 1 concept by Memorandum for CNO (OP-942) in February of 1977 with the following stipulations: [Ref. 9]

* The minicomputers for the NALCOMIS support will be procured as part of the Shipboard Nontactical ADP Program (SNAP) acquisition tc ensure overall compatability with the Fleet non-tactical systems, and commercial type minicomputers will be used at non-deployable CONUS sites.

* No hardware will be installed at any other site until the operational prototype system has been approved by the Navy Senior ADP Policy Official.

ADP hardware/system software for NALCOMIS are to be acquired under the Shipboard Non-tactical ADP Program (SNAP) I, Phase 2. The Solicitation Document covering SNAP I, Phase 2, was released to vendors on 2 September 1980. Initial vendor proposals were received on 19 January 1981. These are in the evaluation process at this time and the proposed contract award target date was 14 October 1981. In the interim period, Interdata 7/32 hardware has been installed at FMSC to enable the Central Design Activity to proceed with application program development and testing. In addition, an Interdata 3220 computer was installed at the field test site, NAS Willow Grove, Pa. for system testing in accordance with the NALCOMIS Module 1 Functionally Phased System Development Plan, prior to the Prototype Operation.

2. <u>Current System Problems</u>

The Baseline MIS currently in use at the OMA, IMA and SSC levels is made up of a variety of manual data collection procedures, manually prepared messages and partially automated systems. In general, the problem with the baseline system is that the procedures for recording and extracting management information data at the aircraft squadron, intermediate maintenance , and supply support center levels are time consuming, error-prone, and are unresponsive to the needs of the local aviation maintenance and supply workers, supervisors, and managers. The voluminous, manually-inscribed paperwork can be expected to increase with a corresponding decrease in quality and an increase in the prolifiration of local self-help systems can be expected to continue under present procedures and conditions.

3. System Objectives

The overall objective of the NALCOMIS Module 1 Program is to contribute to improved aircraft material readiness by providing local maintenance and material managers at the CMA, IMA, and SSC levels with a modern, responsive management information system. The general objectives of NALCOMIS are to: [Ref. 10]

1. Satisfy real-time information requirements of the base level aviation maintenance and material managers;

2. Satisfy the data reporting requirements for up-line information systems;

3. Satisfy mobility requirements of selected NALCOMIS Operational sites, specifically 14 CVs, 12 LPHs/LHAs, 17 MAGs, and deployable aircraft squadrons from 52 NASs and MCASs;

4. Satisfy minimum requirements for contincus operation of the MIS in a high readiness or mobilization environment;

The specific objectives/benefits to be achieved and realized by the implimentation of NALCOMIS Module 1 are listed below. [Ref. 10]

1. Minimum reduction of two percent (2%) in the NMCM (Not Mission Capable-Maintenance) rate.

2. Minimum reduction of five percent (5%) in existing AWM (Awaiting Maintenance) rate.

3. Minimum reduction of three percent (3%) in the NMCS (Not Mission Capable-Supply) rate.

4. Minimum reduction of five (5%) in the PMC (Partial Mission Capable) rate.

5. Reduction of about 2,158 man-year equivalents of technical personnel engaged in non-ADP functions supporting Baseline system operations and reassignment to other tasks within the OMA/IMA/SSC organizations.

6. Minimum reduction of twenty percent (20%) in supply response times.

7. Minimum reduction of twenty percent (20%) in component turn-around time.

8. Minimum reduction of five percent (5%) in BCM (Beyond Capability of Maintenance) actions.

9. Reduction of 305 ADP support personnel.

10. Minimum reduction of twenty percent (20%) in inventory loss of *components through* improved inventory accuracy.

11. Reduction of unmatched records through integration of maintenance and supply data bases.

12. Quality and timeliness improvement in data reported in support of Navy and DOD programs.

4. Proposed Nalcomis Capabilities

NALCOMIS is currently scheduled to be implemented at a total of 95 sites, and is designed to establish and maintain an integrated data base for use at the local site user level. As indicated previously, the system will serve the maintenance function at the OMA, IMA, and the associated Supply Support Center and the scope of the module 1 functions are illustrated in figure 2.2.

Aviation Organizational Maintenance	Aviation Intermediate Maintenance	Aviation Supply Support Management
Maintenance/Material Control • Planned/Phased Scheduling • Unscheduled Maintenance • Work-In-Process Tracking Material Requirements • Repairable Material • Consumable Material • Scheduled Removal Components • Tech Directive Change Kit Maintenance Support • Reliability/ Maintainability Analysis • Equipment Asset Management (IMRL) Configuration Management • Aircraft • Engines • Components • TDC Aircraft Inventory • Gains/Losses • In/Out RRS • Location Readiness Status • Utilization Data • EOC (SCIR) Serial # Tracking • Components, Location/ Status Personnel Management • Master Roster 3-M Reporting O&S Reporting Aircraft Accounting Engine Accounting 3-M Monthly Summary • ~~IFAR/FPEDS~~ Rptg.	Production/ Material Control • ICRL Management • Planned/Phased Scheduling Maintenance • Components • Engines • GSE • Work-In-Process Tracking Material Requirements • Scheduled Removal Components • Repairable Sub/Sub-Subassembly • Consumable Material • Tech Directive Change Kit 3-M Reporting O&S Reporting Personnel Management • Master Roster Maintenance Support • Serialized Component Location/Status • Reliability/Maintainability Analysis • Equipment Asset Management/Utilization GSL PME IMRL Configuration Management • GSE • PME • Engines • Components • Subassemblies Engine Accounting 3-M Monthly Summary	Repairables Management • LRCA Components • AWP Components • IOU Components • Repairables • Receipts from AIMD Requisition Management • Demand Processing • NMCS/PMCS Requisitions • Status • Follow-up 3-M Material Reporting (Aviation) O&S Reporting Engine Accounting

Figure 2.2 NALCOMIS Module 1 Scope

It will assist maintenance and supply management by providing current and accurate information upon which to base decisions. In order to achieve the objectives of the program and realize the benifits discussed above, NALCOMIS Module 1 will have the following general capabilities discussed below.

a. Automated Source Data Entry

According to the Automated Data System (ADS) Development Plan, the automated source data entry system will utilize preposted data in pre-formatted displays to eliminate entry of redundant data and permit editing and validation of added data. Use of a site oriented centralized data base (SOCIDAB) will minimize the use of costly manual records. Exception reporting and on-line real-time access is one of the capabilities that is required of NALCOMIS. The data base will be on-line 24 hours a day, seven days a week, with the exception of scheduled maintenance. In addition to providing prescribed information as defined by users, It will support local management with an interactive query capability which will provide information to satisfy one-time reporting information needs. It will provide all managers with data from a common source which will be maintained current through real-time updating and query capability. OMA, IMA, and SSC managers will communicate with the common data base and with each other through remote job entry devices connected to a minicomputer.

b. System Generated Schedules and Reports

Maintenance schedules and supply requirements may be generated by the system based on work on hand, scheduled maintenance requirements, technical data information, work force and skills inventory, availability of parts, priorities, and funds status. Actual values can be tracked against projections and appropriate management intervention and judgement may be applied.

c. Information Availability

Further capability of the system will allow for tracking of maintenance actions as they occur. Required cost and statistical information can be accumulated as it occurs and in the detail desired by management. Accumulated costs and statistics will permit local management to analyze trends during the reporting period and shorten the time between the end of the reporting period and the availability of information to up-line users.

i. Interface with Other Systems

In addition to the previously mentioned benefits, NALCOMIS will interface with or provide data inputs to other major Integrated Logistic Support (ILS) systems in the Naval Aviation Logistics Community. Some of the specific systems with which NALCOMIS will interface are listed below and illustrated in Figure 2.3.

* Aeronautical Repairable Management Systems (ARMS)

* Improved Repairable Asset Management (IRAM) includes
  - Closed Loop Aeronautical Management Program (CLAMP)
  - Serialized High Cost Asset Reporting Program (SHARP)
  - Fleet Intensified Repairables Management (FIRM)

* Maintenance Data System (MDS)

* Subsystem Capability Impact Reporting (SCIR)

* Naval Aviation Logistics Analysis System (NALDA)

* Flight Readiness Evaluation Data System (FREDS)

* NORS Improvement Program (NIP)

* Analytical Maintenance Program (AMP)

* Fixed Allowance Management/Monitoring System (FAMMS)

* Shipboard Uniform Automated Data Processing System-End Use (SUADPS-EU)

* Uniform Automated Data Processing System for Stock Points (UADPS-SP)

* MSDO Level II Supply System for NAS

Since the system is designed to be a totally integrated, interactive system users will have access to all data residing in the central data base which is controlled by the data base management system. Each organization's data will be uniquely identified to that organization, facilitating data integrity and security.

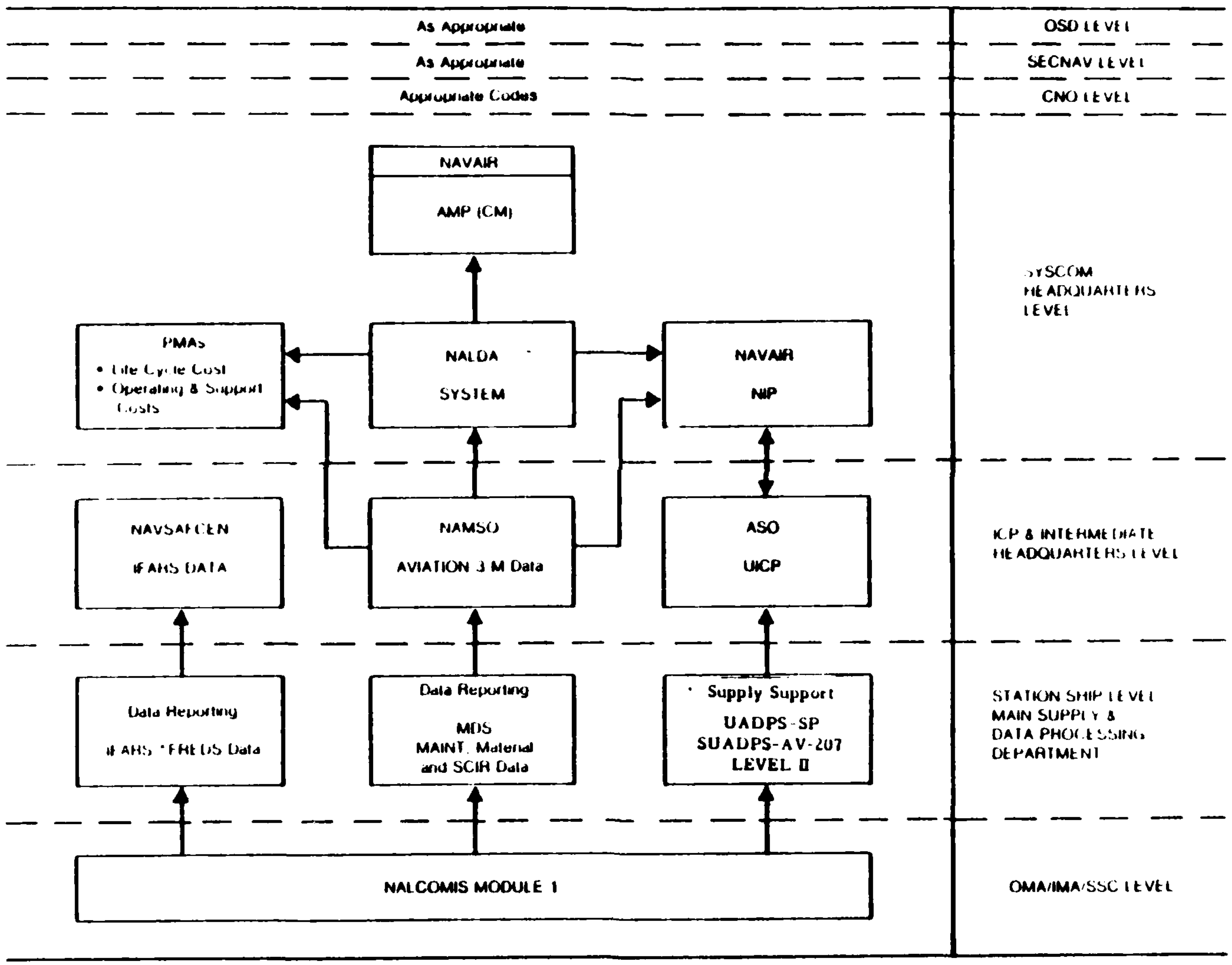
5. NALCOMIS Software

The software environment for NALCOMIS will have to be discussed in general terms and required capabilities since the system is not yet operational and the software is not fully implemented on prototype systems. The applications software will be developed by the central design activity at Fleet Material Support Office, Mechanicsburg, PA. The system software will be procurred commercially as a standard package.

a. System Software

The system software to be implemented on the NALCOMIS system must at a minimum be comprised of an operating system, data base management system, compilers, and utility packages.

(1) Operating System. The requirement is for a real-time, disk oriented operating system which supports



*FREDS data is passed to the MAW. The MAW processes the data and passes IFARS data to NAVSAFCEN and flight data to NAMSO

Figure 2.3 NALCOMIS Interface with ILS Community multi-programming and interactive queries from multiple users. It should have the capability to concurrently process real-time tasks in the foreground and batch programs in the background. The operating system and communications controller will need to be able to support from 11 to 208 remote source data entry terminals depending on the size of the NALCOMIS installation.

(2) Data Base Management System. The requirement for a multi-user, real-time capability drives the requirements for an efficient data base management system (DBMS) which controls all communications between the users and the mass storage of data. In addition to handling the storage and retrieval of data, the DBMS must ensure data integrity, security and privacy of data, and data independence (application programs independent from structural changes in the data base). The DBMS must accomodate a Site-Oriented, Centralized and Integrated Data Base (SOCIDAB) which will be accessed to meet on-line inquires from users at the OMA, IMA, and SSC levels, utilizing a number of different to access similar data. A query capability is another required feature of the DBMS.

(3) Compilers. The compilers required must be able to support ANSI COBOL as the primary language and FORTRAN as a supplement.

(4) Utility Packages. The required utility programs must be able to sort and merge data files, and copy data from one medium to another. Report generators are also required in connection with the formatting of data reports in response to queries. The utility programs may be a part of the other system software or may be provide as a seperate software package.

b. Application Software

The applications software for NALCOMIS can be broken down by functions and described generally as subsystems that support the IMA, OMA, and SSC activities.

(1) Flight Activity. Primarily a data collection function for flight data in support of scheduled maintenance requirements; preparation of reports for aircraft log books and Aeronautical Equipment Service Records (AESR); information needs of Navy Aviation Maintenance Support Office (NAMSO); and the requirements of the Individual Flight Activity Reporting System (IFARS) and the Flight Readiness Evaluation Data System (FREDS).

(2) Maintenance Activity. To serve the OMA and IMA by providing data on the identification and approval of a maintenance requirement; operational status of assigned aircraft, engines, and ground support equipment (GSE); identification of all outstanding maintenance against aircraft, engines, GSE and repairable components; current work load of each maintenance work center; the status of each maintenance action; alerts of scheduled maintenance action; and establishing and maintaining the Individual Component Repair Listing (ICRL).

(3) Configuration Management. To serve the OMA and IMA by maintaining the current configuration of the aircraft, engines, GSE, and components; track configured items; and to maintain records of incorporated and not incorporated technical directives.

(4) Maintenance Personnel Management. To maintain the maintenance personnel roster and to track personnel availability for local and specific assignments; personnel qualifications and requalifications requirements and dates; on-board versus personnel allowances; replacement personnel by skills and reporting dates; and to project maintenance personnel losses.

(5) Asset Management. To serve OMA and IMA by providing systematic inventory and location accountability of assigned aircraft, GSE and test benches to include gain/loss transactions, inventory status change, and GSE utilization data and subcustody actons.

(6) Supply Support Center. To process demands for repairables, repair parts and consumables for maintenance actions. The supply management of the repairables will satisfy OMA and IMA interface requirements.

(7) Local/Up-Line Reporting. To summarize, format, and transmit up-line data including Aviation 3-m and NALCOMIS Operating and Support (O&S) data.

6. NALCOMIS Hardware

The NALCOMIS System Hardware Configuration, which will be described below in general terms since the hardware contract has not yet been awarded, basically consists of a processor subsystem, mass storage subsystem, local peripheral subsystem, and remote peripheral subsystems (Figure 2-4). [Ref. 9]

THE ADPE FOR NALCOMIS MODULE 1

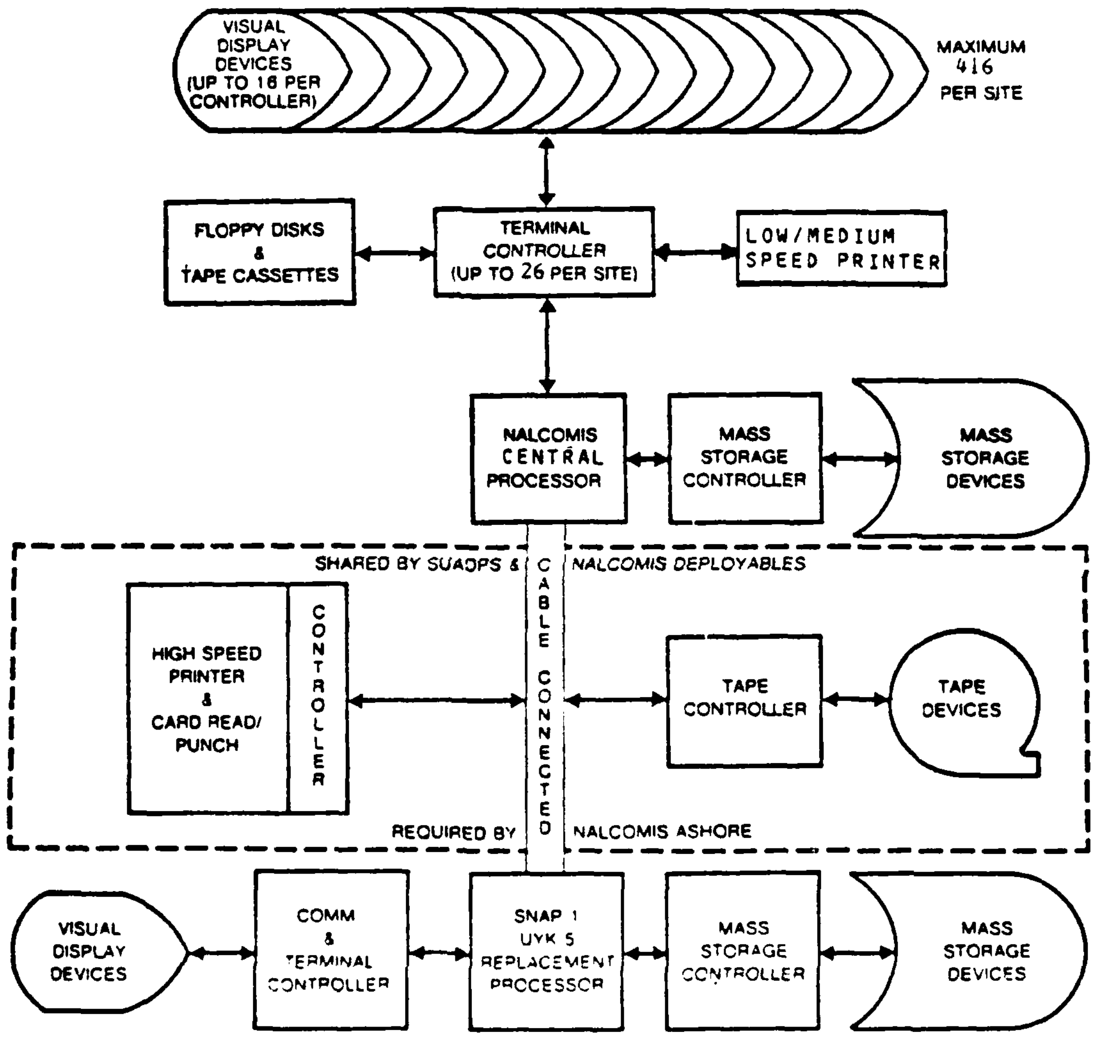


Figure 2.4 Proposed NALCOMIS Hardware Configuration

a. Processor Subsystem

The processor subsystem consists of a central processor from the upper end of available minicomputers which will handle the NALCOMIS Module 1 workload. The system must support ANSI COBOL-74 and FORTRAN programs and utilize a compatible DBMS. It must be capable of operating in a multiprogramming environment and will need a task handler as well as the system support software described earlier. The central processor must have at least 512K bytes for system and application programs.

b. Mass Storage Subsystem

The proposed mass storage subsystem consists of a disk controller with three disk drives totalling a minimum of 400 megabytes of storage. These storage devices will house the SOCIDAB, systems software library, the applications software library, up-line statistics that will be accumulated on an event oriented basis, and work and temporary file space.

c. Local Peripheral Subsystem

The local peripheral subsystem consists of a tape controller with two tape drives, high speed line-printer, and a card reader/punch device. The local peripheral is to be provided for NALCOMIS shore-based sites only. The local peripheral subsystem for NALCOMIS deployable sites (currently only encompassing ships and MAGs and not deployable land-based aircraft squadrons), will be provided with the AN/UYK-5 replacement hardware, and therefore shared by the NALCOMIS system.

The tape drives that the system will use or have access to must be industry compatible. The magnetic tape storage medium will be used for storage of historical and other file data necessary to support analysis and other programs which will operate in a batch mode; as transaction audit tapes on which the data necessary for research and audit to resolve system discrepancies can be retained; as checkpoint tapes on which the data necessary to support a restore, recovery capability will be stored; for recording data to be transmitted to up-line users; for dumping disk files to assist in restore and recovery actions and for reduction to hard copy if a manual fall-back posture is to be invoked; and for storing reports that are spooled to be printed later in a batch mode.

6. Remote Peripheral Subsystem

The remote peripheral subsystem consists of a front end processor/controller supporting up to 16 key visual display terminals. Each of these subsystems will have a page printer with and a floppy disk controller with dual drives that have up to 2MB of storage.

7. NALCOMIS Summary

The NALCOMIS Module 1 program is not operational at this time. NALCOMIS, as approved in 1977, was to be fully implemented and operational by 1986. However, system development problems have delayed program progress and it now appears that NALCOMIS Module 1 will not be fully implemented before 1992 at the earliest. [Ref. 11]

As previously discussed, NALCOMIS Module 1 coverage entails a management information system oriented soley toward maintenace functions. Further modules have yet to be defined but it is safe to say that they would not be implemented until after 1992. Therefore, a total management information system that not only supported the maintenance effort but operations, administration, and training functions as well would not be implemented for the next ten to fifteen years at the present rate of NALCOMIS development.

D. PORTABLE LOGISTIC SUPPORT (PLS) SYSTEM

The Portable Logistic Support System is a COMNAVAIRLANT program designed to provide an interim solution to Naval Aviation maintenance information needs during the period that NALCOMIS is being developed and implemented. It is strictly aimed at carrier-based squadrons and does not address or include land-based squadrons that exist in the VP community. Essentially, PLS is a functional extension of existing automated systems and could be re-named "Mini-ATSS". The Aviation Training Support System, which is designed and installed as a dedicated training system, contains the RCAS subsystem described previously. RCAS was designed to fill a need of matching aircrew and syllabus training assignments with the correctly configured aircraft. An extension of RCAS was designated the Comprehensive Asset Management System (CAM) which maintains the status of aircraft, engines, and selected aeronautical equipment including configuration data. CAM was approved for prototype evaluation at NAS Cecil Field, Florida and was evaluated as being a valuable maintenance management tool. PLS expands the functional capability of CAM and as described in the System Decision Paper for Milestone 1, provides both the hardware and support required for system implementation. [Ref. 12] In addition to the maintenance software, PLS will incorporate certain personnel and training modules from the Aviation Training Support System.

1. System Objectives

The overall objective of the PLS project as stated in the Milestone 1 System Decision Paper is to: [Ref. 12]

> Provide carrier-based Atlantic Fleet squadrons an improved information system to ease the administrative burden of maintaining maintenence and logistics data. At the same time, PLS will enhance the usefullness of organizational asset management data for squadrons and up-line managers.

Two assumptions that were made in developing the PLS concept are most important in light of other development efforts. The first is that PLS will not impede the NALCOMIS development effort in any way and that PLS system life will end upon NALCOMIS implementation. The second major assumption is that the system must be compatible for all squadrons.

2. PLS Software

The PLS system proposes to use existing ATSS software initially and provide additional enhancements to the software by 1983. The system software would consist of the RSTS/E operating system discussed previously. This would provide for maximum compatability and sharing of data between the units designated for the Portable Logistics Support system and the Fleet Replacement Squadrons that utilize the ATSS. The applications software will basically consist of ATSS training and maintenance software with some additional enhancements as listed below:

1. Maintenance Software

   * Additions to Aircraft Record
   * Enhance airframe technical directive and configured item capability
   * Monthly Maintenance Plan
   * Individual Material Readiness List (IMRL)
   * PME calibration
   * Expand JCN Tracking
   * Uninstalled engine/component tracking

2. Training Software

   * Adapt Personnel Subsystem
   * Event Scheduling
   * Training Track
   * Gradebook

3. <u>PLS Hardware/System Configuration</u>

There were many alternatives considered in the formulation of the Milestone 1 System Decision Paper in regards to system and hardware configuration. The alternative that was recommended consists of a distributed system of micro/mini-computers that are provided to each squadron, functional wing and carrier air wing. Each squadron system would be identical and supports the functional requirements of squadron users. Certain data would be provided on a routine basis to the functional wing or carrier air wing system depending on whether the squadron was on deployment or not. The wings would then exchange data between carrier and shore location for updating specific aircraft and personnel/training bases. The distributed PLS configuration is illustrated in Figure 2.5.

The specific hardware to be used as specified in the acquisition strategy of the PLS Milestone 1 SDP is centered around the DEC PDP-11 family of mini-computers. The acquisition strategy assumes that sole source procurement will be allowed and that the original VTS Support Contract, N00123-80-D-0071, will be used to acquire 48 squadron systems and 12 Wing systems.

The proposed central processor would be a PDP 11/23 with 256K bytes of main memory. This mini-computer along with associated disk drives and controllers weighs about 100 lbs. and fits in 2 cases about the size of a normal suitcase

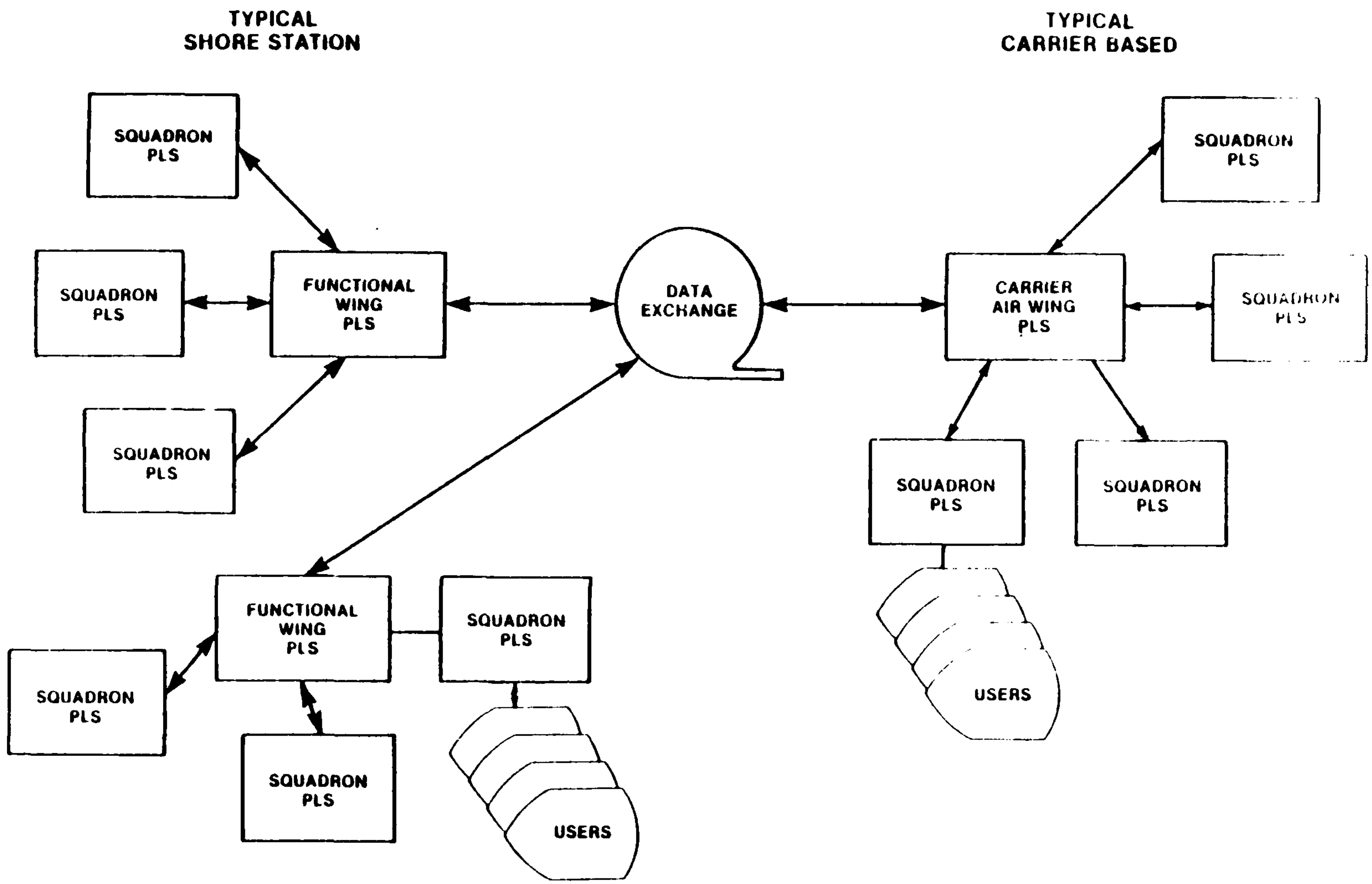


Figure 2.5 **DISTRIBUTED PLS**

which would make it ideal for deployable squadrons. The specific hardware configurations for Wing and Squadron installations is shown in Figure 2-6. [Ref. 12]

4. PLS Summary

The PLS system was conceptualized to provide an interim solution to todays management information problems in the Naval Aviation community. However, the originators of the PLS concept included only a part of the Naval Aviation community (carrier based squadrons), in the initial plans and these squadrons are all based on the East coast. The assumptions made in the Milestone 1 SDP concerning the acquisition methodology, do not follow established guidelines and regulations in regards to ADPE procurement. The basis to procure the PLS system under sole source was not stated in the system decision paper but it appears that the sponsors of the PLS system were trying to slide the project in under the exemption granted to the Aviation Training Support System by the CNO. At the present time, Milestone 1 approval has not been granted.

The concepts presented with the Portable Logistics Support Project are extremely valuable in solving the information needs of the total Naval Aviation community and

Figure 2.6 PLS Hardware Configurations

QUANTITY	DESCRIPTION
1	PDP 11/23 CPU, 256 KB memory 1 MB Floppy Disk
8	Serial Communications Ports
1	27 MB Winchester Disk Drive and Controller
2	Hard Copy Terminals
2	CRT Terminals
1	Uninterruptable Power Supply

Squadron PLS Configuration

Wing PLS Configuration

QUANTITY	DESCRIPTION
1	PDP 11/23 CPU, 256 KB, Line Clock 1 MB floppy disk
16	Serial Communication Ports
1	134 MB Winchester Disk Drive and Controller
8	Optical Link Drivers
4	Hard Copy Terminals
4	CRT Terminals
1	Magnetic Tape Drive and Controller (9 Track, 800 BPI)
1	Uninterruptable Power Supply
1	300 LPM Printer and Controller

not just carrier-based squadrons. The PLS concept provides automated information support both at the home base and while deployed. The design concept of using distributed mini-computers would allow for a fail-soft capability and back-up.

Prototype PLS systems have already been developed and undergone limited testing at selected sites. The main advantage of proceeding with the PLS concept is that it could be implemented very rapidly and the Naval Aviation community would not have to wait until 1992 to receive the benefits of an automated management information system.

E. CHAPTER SUMMARY

This chapter summarized existing management information systems and systems in development at this time for the Naval Aviation community. The Aviation Training Support System is operational at this time and provides valuable support to the Fleet Replacement Squadrons and Training Commands but provides little assistance to Operational Squadrons due to the limited access and resources made available to them. The CNO's restriction on the use of ATSS for training functions only, prohibits operational squadrons from utilizing this valuable resource even though the majority of training that an aircrew member receives is accomplished at the operational squadron after the crewmember leaves the FRS.

NALCOMIS is an approved program and a line item in the budget but will not provide the needed MIS support for another ten years. The NALCOMIS Module 1 concept is limited to supporting only maintenace and supply information needs and provides no support to the overall administrative, training, and operational functions.

The Portable Logistic Support System as a concept is sound but the acquisition stategy does not follow the guidelines and regulations governing ADPE procurement. The design and logical functions that PLS would perform are a step in the right direction in not only satisfying the VP community information needs but that of all Naval Aviation whether carrier-based or not.

III. POLITICAL AND REGULATORY ENVIRONMENT

The Information Systems development that has taken place in Naval Aviation, and the initiatives being considered currently, have tremendous potential. They fail, however, to specifically address the information needs of the Patrol Aviation community. Expansion of current systems or creation of similar systems would implicitly seem to be the logical or even the most economically feasible approach to take to meet the perceived need of the Patrol Squadrons.

Unfortunately, it is not possible to simply take from those systems that have been discussed previously the functions or features that are necessary and desirable, and utilize them in an effective, efficient manner at the Patrol Squadron level without first understanding and then dealing with two major areas of consideration.

First of all, regulatory considerations must be well understood and must be addressed with tremendous attention to detail. Government Procurement Regulations, specifically those concerned with acquisition of automated data processing equipment (ADPE), are most pertinent. Procedures and regulations concerning the planning, programming, and budgeting of funds to bring about the procurement of a system are also important. It is certainly not the intent of this research to completely educate the reader in the areas of ADP procurement and the PPBS process. Development of a good understanding of how these factors must be addressed is unavoidable, however, when reviewing their relationship with the development of a specific system.

Secondly, the political environment in which new systems are conceived, born, cloned, mutated, or aborted is an area that must not only be understood, but must also be studied continually and positively influenced at every opportunity. The obvious reasons for concern in the political environment are based on the fact that no matter how fantastic a proposed system might be, it will never be implemented without the support and approval of all cognizant parties. The "parties" concerned are not necessarily individuals. Individual Commanders, Program Managers, Sponsors, or Action Officers may leave a significant mark, and in some programs prove to be the reason for the short term success or failure of the project. In the context of the entire life-cycle of programs developed over long periods of time, however, they are simply players in the game. It is, rather, the influence of entire programs, agencies, and Commands that create the political environment in which progress and new ideas must either flourish or fail. This influence is primarily created and fostered by regulatory and budgetary control.

This chapter discusses both the regulatory considerations and the political environment that pertain to the introduction of information systems into Operational Patrol Squadrons. This is accomplished, initially, by reviewing two specific audit reports which address information system development in Naval Aviation. In this context, it is possible to gain a greater understanding as to the place that the VP Community has taken in this development. It will serve as a basis from which the current environment can be examined, in order to develop alternatives for the future.

A. ATSS AUDIT

1. Introduction

As was mentioned in the preceding chapter, ATSS has been used to a limited extent by Operational VP Squadrons during their at-home cycle. This is possible due to the squadrons' proximity to the ATSS sites at the Fleet Replacement Squadrons (FRS), the most active being the site at NAS Moffett Field. This limited usage, although generally accepted and encouraged by Fleet Commanders and developmental personnel, is an extention of the ATSS system that is not authorized under existing procurement policies and procedures. If this were not the case, VP Squadrons would have all the functions of ATSS available to them during their at-home cycle, and would surely support an extention of these capabilities to all operational deployment sites. However, due to the method by which ATSS was procured, and the regulations which it is currently operating under, the patrol squadrons are left without this tremendous capability, underscoring the need for this analytical review.

This situation, and its attendent political and regulatory complexities, is highlighted in Naval Audit Service Audit Report D30030, "Development of the Aviation Training Support System, Naval Air Systems Command", which was completed on September 26, 1980.

The objective of the audit was to evaluate policies, procedures, and practices related to the planning, development, and acquisition of the Aviation Training Support System. [Ref. 4] The review concentrated on the areas of planning, funding, and execution, with emphasis on compliance with procurement regulations, integrated logistics support and manpower planning, and employment of automated data processing resources.

The results of the audit indicated that ATSS development and acquisition have generally been satisfactory. The following areas were, however, mentioned as those where improvement can be made:

1. Opportunities exist for reducing costs by beneficially employing ATSS hardware and software for requirements of other related information systems and by manning operational sites with government vice contract employees.

2. Improvements can be made in fund administration and in the integrated logistic support areas of planning and configuration control. [Ref. 4]

The most significant item noted, in terms of importance to Patrol Aviation, is the fact that ATSS capabilities are not fully used. Political and regulatory considerations are collectively responsible for this situation. Further examination of these factors is presented quite well in the findings of the audit.

2. <u>Findings</u>

The Chief of Naval Operations (CNO) has not permitted full use of ATSS capabilities through expansion beyond the FRS level into other training or readiness reporting areas where equipment or software could be shared. As a result, related systems developments cannot benefit from an offshoot of ATSS until this is changed. CNO's refusal to expand ATSS was based on the perceived need to maintain ATSS exemption status under the Automated Data Processing Equipment (ADPE) acquisition regulations. [Ref. 4] The audit explained that this exemption is no longer needed, because the final 10 ATSS systems to be purchased were ordered under a FY 1980 contract. It was stated that removal of the exemption status would more than benefit managers within and beyond the training community by providing more timely and accurate management data on a cost effective basis to a wider range of users than any other system could provide individually.

Department of the Navy policies and procedures pertaining to ADP systems specifications, selection, and acquisition are set forth in SECNAVINST 5236.1A. [Ref. 13] This instruction defines general purpose, commercially available ADP components and the equipment created from them, regardless of use, size, capacity, or price, which are applicable to the cited approval authority. It also allows for specific types of ADPE which are exempt from the procurement regulations upheld by the approval authority. Even though ATSS uses standard off-the-shelf ADPE, the Chief of Naval Material (CNM) designated ATSS as a training device and exempted it from ADPE approval requirements, eliminating the need for many time consuming procurement practices.

Naval Aviation Procurement funds (APN) have financed the system from its beginning until the present. During FY 1978, NAVCOMPT reviewed the ATSS exemption status and ruled that ATSS was not a training device as defined by DOD/Navy budget policy. NAVCOMPT, in conjunction with CNO, reclassified ATSS as a computer-assisted training system within the generic category of equipment configured solely for training applications. NAVCOMPT authorized continued APN appropriation financing of ATSS hardware and software, predicated on ATSS use solely for aviation training applications with no other expansion capabilities. This was apparently done to ensure that program execution would be consistent with APN budget justifications submitted to Congress.

During the past four years, various sponsors have initiated data processing systems which represent either an extention of ATSS capabilities within the general category of training, or applications beyond the scope of training. Although hardware and software duplication could be avoided by sharing resources with ATSS, OP-592 has consistently denied use of ATSS resources for systems which require the expansion of ATSS to operational squadrons (even for training support), or which generate output that is not training related. Examples of these include:

1. Fleet Area Control and Surveillance Facility (FACSFAC).
2. Tactical Aviation Configuration Organizational Management System (TACOMS). (see RCAS, Chapter 2)
3. Liberty Elite.
4. Individual Flight Activity Reporting System (IFARS).

All of the systems listed are logical extentions of of the existing ATSS. Three of the systems provide primary benefits to the training community through scheduling training resources (FACSFAC), maintaining configuration status of aircraft used for training purposes (TACOMS), and monitoring training of operational squadron personnel (Liberty Elite). IFARS reporting is tremendously successful at the FRS level, and would greatly enhance the timeliness and accuracy of information at the individual squadron level. All four systems illustrate the opportunity for eliminating duplicate data collection and hardware procurement.

As mentioned previously, existing regulations governing the procurement of ADPE appear to preclude the use of ATSS outside the training environment unless that system is designated as general purpose ADPE. Cognizant CNO, NAVDAC, and NAVAIR personnel have stated that the requirement to perform an economic analysis, fully justified, and request appropriate delegation of procurement authority from GSA for future ATSS acquisitions could jeopardize sole source procurement of identical hardware, while competitive selection could result in software modifications to obtain compatibility with the existing ATSS system. [Ref. 4] The auditors felt, however, that this action would only insure that future system acquisitions would produce the most cost effective system to meet identified requirements.

3. Recommendation

The recommendation of the auditors to CNO was that the ATSS exemption be discontinued, and that the sharing of ATSS hardware and software with other approved ADP systems be encouraged. [Ref. 4] CNO concurred and stated the following:

> At its inception, the ATSS (formerly VTS) was designed and developed to satisfy an urgent fleet training requirement for the aviation community. The system was initially procured through a competitive contract as a turnkey training device under the end-item clause of

Defense Acquisition Regulations 3.1100.1(a) and SECNAVINST 5236.1A, par. I.B.2.d. At the time the exemption was granted, ATSS was a valid training system that contained a computer, provisions for interconnections with training simulators, and logic components for interaction between the system and students undergoing training. However, through the evolutionary development process, ATSS has been reduced in scope to the stage of performing training, administration, and management functions, as well as the primary function of training aviation maintenance and aircrew personnel.

ATSS, as it exists today, meets the intent and scope of an automated information system and should be managed, developed, acquired, and funded under ADP rules and regulations. However, one point must be emphasized. Regardless of ATSS status, it remains to be determined, through detailed feasibility studies and economic analyses, to what extent other systems can be accomodated and savings achieved without degrading the primary function of providing highly trained and qualified fleet replacement personnel for the aviation community.

CNO will take the necessary action to remove the ATSS exemption from ADPE regulations consistent with an orderly transition scheme so as not to disrupt ongoing ATSS efforts. [Ref. 4]

B. NALCOMIS AUDIT

1. Introduction

On June 19, 1981, the Naval Audit Service Capital Region released to CNO (OP-008) and Commander, Naval Air Systems Command (AIR-08C) a draft finding from Audit D30051- "Development of the Naval Aviation Logistics Command Management Information System". The finding, entitled "The need for continuing NALCOMIS development is questionable", provides concise, up-to-date information on the status of NALCOMIS development, and provides strong justification for a recommendation which would have a tremendous impact on MIS development in the Naval Aviation community. [Ref. 11]

During mid October 1981, the final draft of Audit D30051 was released to CNO. This occurred after 3 months of rebuttal by NALCOMIS and extensive reinvestigation by Naval Audit Service auditors. The results of the audit were essentially the same after reexamination, leaving the auditors recommendation essentially intact. [Ref. 14]

As this chapter is being written, CNO is in the process of reviewing the results of the final audit. Future NALCOMIS development will be dependent on the events that take place in the next few months. Only by reviewing the audit findings can one gain an appreciation of the factors involved in plotting a developmental course for the future, which will have a direct effect on the needs and eventually the capabilities of Naval Aviation.

2. Findings

The Naval Aviation Logistics Command Management Information System (NALCOMIS) is intended to provide the Naval Aviation community with a standard automated information system that will assist managers in accomplishing aviation maintenance and supply functions, and should result in increased aircraft mission capability, increased personnel effectiveness, and improved data reporting. It is not designed to handle all of the information needs of an individual squadron, but would give squadron commanders access to a tremendous amount of information, unavailable before, which could eventually be instituted into a squadron MIS.

However, after nine years of development effort costing $22.2 million, the auditors have determined that little progress has been made. It is estimated that completion and implementation of the system will require at least 11 more years of effort and additional life cycle investment costs of $307.8 million. [Ref. 11] In view of these factors of time and money, the need for further NALCOMIS development, as presently envisioned, was determined to be questionable.

The auditors' basis for these estimates was based on their examination of the management information systems being developed at Naval Weapons Center, China Lake, California (NAVWPNCEN) under the sponsorship of Commander, Naval Air Force Atlantic (COMNAVAIRLANT). It was felt that these systems, already in operation or final stages of development, are capable of fulfilling NALCOMIS objectives. It was further stated that by incorporating the features of these systems in place of continued development, the Navy could expedite implementation of of the management information system objectives by at least 8 years; reduce life cycle investment costs at least $217.8 million, or over 70%; and provide the aircraft community a more managable and versatile system. [Ref. 11]

The NAVWPNCEN systems examined are, interestingly, all offshoots of the ATSS concept. The systems cited in the audit include:

CAMS - Comprehensive Asset Management System

ECAMS - F/A-18 Enhanced Comprehensive Asset Management System

IRIS - Interactive Resource Information System

PLS - Portable Logistics System

TACOMS- Tactical Aviation Configuration Organizational Maintenance System

A general review indicated that modules (applications) of these systems line up with and provide essentially the same information intended to be procured by the NALCOMIS subsystems, as listed in Table I.

The completed NAVWPNCEN systems are installed and currently operating satisfactorily at 11 of the sites designated for conversion to NALCOMIS Module I. These sites include nine naval air stations, an aircraft carrier, and

TABLE I

NALCOMIS/NAVWPNCEN MIS Functional Comparison

NALCOMIS subsystems 1/	COMNAVAIRLANT systems: Modules/applications	Status
Flight activity	Engine and airframe	- Operational
Configuration management	Configuration, engine, airframe, technical directive	- Operational
Maintenance activity	Configuration, engine, VIDS/MAF-SAF 2/	- Operational
	Avionics	- Development
Asset Management	Ground support equipment, airframe	- Operational
Supply support center	Supply support	- Development
Maintenance personnel	Maintenance personnel	- Operational
Local/upline reports	Local/upline report	- Operational
System support (SNAP)	System support (PDP 11/23)	- To be acquired

1/ All NALCOMIS subsystems under development

2/ Visual Information Display System/Maintenance Action Form - Support Action Form the NAVWPNCEN. Cognizant development activity personnel said that further systems requirements that may be needed to fully satisfy NALCOMIS objectives would present no development difficulties. [Ref. 11]

The element of the timeliness of NALCOMIS implementation, versus that of the NAVWPNCEN developments, and the relative costs of the two concepts, were highlighted in the audit findings.

In regards to the implementation time, systems development problems, as discussed in Chapter 2, have delayed program progress and it now appears that NALCOMIS Module I can not be implemented before FY 1992 at the earliest. Unlike NALCOMIS, site preparation and activation for NAVWPNCEN management information systems does not involve extensive renovations; shipboard installations can be done at sea as they do not require the ship to be in overhaul. Auditors were advised that NAVWPNCEN system phase-in could proceed immediately and cover all afloat and ashore sites within 3 years. It was also stated that any work needed to develop/refine software to meet NALCOMIS requirements not presently covered could be completed during system phase-in.

The relative cost differential of $217.8 million in life cycle costs that the auditors predict as minimum savings if NAVWPNCEN systems were used in lieu of NALCOMIS Module I were gleaned from the cost categories system/project management, ADP hardware, system test and evaluation, and site activation. The audit review in these areas showed the following cost differentials favoring the NAVWPNCEN systems:

1. System/project management costs could be reduced by $6.8 million.

2. ADP hardware costs could be reduced by $169.3 million.

3. System test and evaluation costs could be reduced by $23.1 millicn.

4. Site activation costs could be reduced by $18.6 million.

3. Summary

The auditors findings and overall cbservations are summarized quite well in the following paragraph. Both regulatory requirements and political inferences are contained in the auditors words, strengthening the position of the authors as to the importance of these factors:

> SECNAVINST 5231.1A and OPNAVINST 5231.1 provide standards for managing and justifying automated data systems from inception through full operation. The standards require that the system be capable of meeting its objectives, be the most effective and econ.mical means of satisfying the requirement, and be acle to be implemented within a reasonable period of time. The NAVWPNCEN mangement information system appears superior to NALCOMIS when judged by these standards. As developed, it provides a reasonatle framework that can be expanded or refined as required to meet the objectives set forth for

NALCOMIS at a much lower life cycle investment cost. Implementation of this system in place of NALCOMIS would save the Navy a minimum of $217.8 million. The NAVWPNCEN system also can be fully implemented and operational eight years earlier than NALCOMIS. Throughout its history, NALCOMIS has been justified on the basis of urgent need. However, nine years have passed since the Navy initiated efforts in FY 1972 to automate information covering the functions associated with aircraft maintenance and support. It appears unreasonable that the aircraft community should have to wait another 9 to 11 years until FY 1990 or FY 1992, or 18 to 20 years overall, to begin obtaining the automated aviation maintenance information system benefits of a fully operational NALCOMIS when the need can be satisfied much earlier by using another system. [Ref. 11]

4. Recommendation

Based on their findings, the Naval Audit Service recommended in both their draft audit finding and in their final audit report that CNO discontinue further NALCOMIS Module I development. This was recommended in favor of utilizing resources as required to adapt NAVWPNCEN management information systems, previously under the sponsorship of COMNAVAIRLANT, for the Naval Aviation community's use in executing the Naval Aviation Maintenance Program.

C. CHAPTER SUMMARY

Clearly, there exists a void in Patrol Community MIS involvement and development. This developmental void in automated information systems is a direct result of the political and regulatory environment that has been presented. Ongoing development is, and will continue to be, subject to the same environment. Therefore, it is imperitive that Patrol Aviation take on this problem as a Community to ensure that its needs are addressed and met in current and future information systems developments. A commitment to this goal must be made quickly, because the time involved in the system development process is long and the need is immediate. This does not necessarily mean that current developments will suffice, or that rapid implementation is even politically or legally possible. What is clear is that efforts to circumvent accepted systems acquisition regulations will not be tolerated, and that political support is very dependent on the cost/effectiveness of proposed systems, especially in view of the current economic environment. This view was reinforced, quite strongly, by the recommendations given in the audit reports reviewed. The audits also illustrated some facts that will become very critical in developing alternatives. NALCOMIS development is, at present, a tangible program with economic justification and political acceptance, but it is under close scrutiny as presently envisioned, which may cause sweeping changes to occur. Further changes to NALCOMIS could, depending on the specific methods of adjustment, cause the system to be implemented even later than anticipated or could cut development and implementation time significantly. Unfortunately, no matter what hardware and software is used, unless the functional needs of the squadron are met, the system is not, by itself, the answer. Existing ATSS sites will continue to assist operational squadrons during at-home periods, but due to a lack of resources and problems of mobility, those assets will not satisfy a significant portion of of present and future at-home needs, and fail completely for deployed squadrons.

Squadron needs have, thus far, been addressed in terms of systems capabilities, or more precisely, in terms of the lack of capability now available. In other words, if a squadron function has been automated and implemented on a specific system, it has been implicitly assumed that a squadron information need exists, based on the capability to automate that function. In order to pinpoint more exactly the shortcomings of present operations, and to forcast more exactly the most feasible paths of development, it is essential that squadron needs be presented in terms of functional requirements resulting from specific Patrol

Squadron organization. This has not been done in the past. Prior to this study, the majority of developmental analysis regarding automated information systems in Naval Aviation have been geared to carrier-based squadrons and air-wings and may or may not reflect VP needs.

Chapter Four analyzes Patrol Squadron organization and procedures, and cites specific deficiencies, in order to clarify and reinforce the essential informational needs discussed thus far.

IV. SQUADRON ORGANIZATION AND PROCEDURES

In order to establish a need and subsequently conduct a feasibility assessment for any system, it is imperative that one understand the organization and its current operating procedures in order to derive user requirements. This chapter will identify the Patrol Squadron organizational structure and relationships and discuss current procedures in order to identify any deficiencies that might exist in its information needs.

A. SQUADRON ORGANIZATION

VP Squadrons are normally composed of an executive branch consisting of the Commanding Officer, Executive Officer, and from four to six departments depending on its complement of LCDRs. The departments are classified according to their functional areas of responsibility (Figure 4.1), and consist of:

1. Operations Department
2. Training Department
3. Administation Department
4. Safety/NATOPS Department
5. Maintenance Department

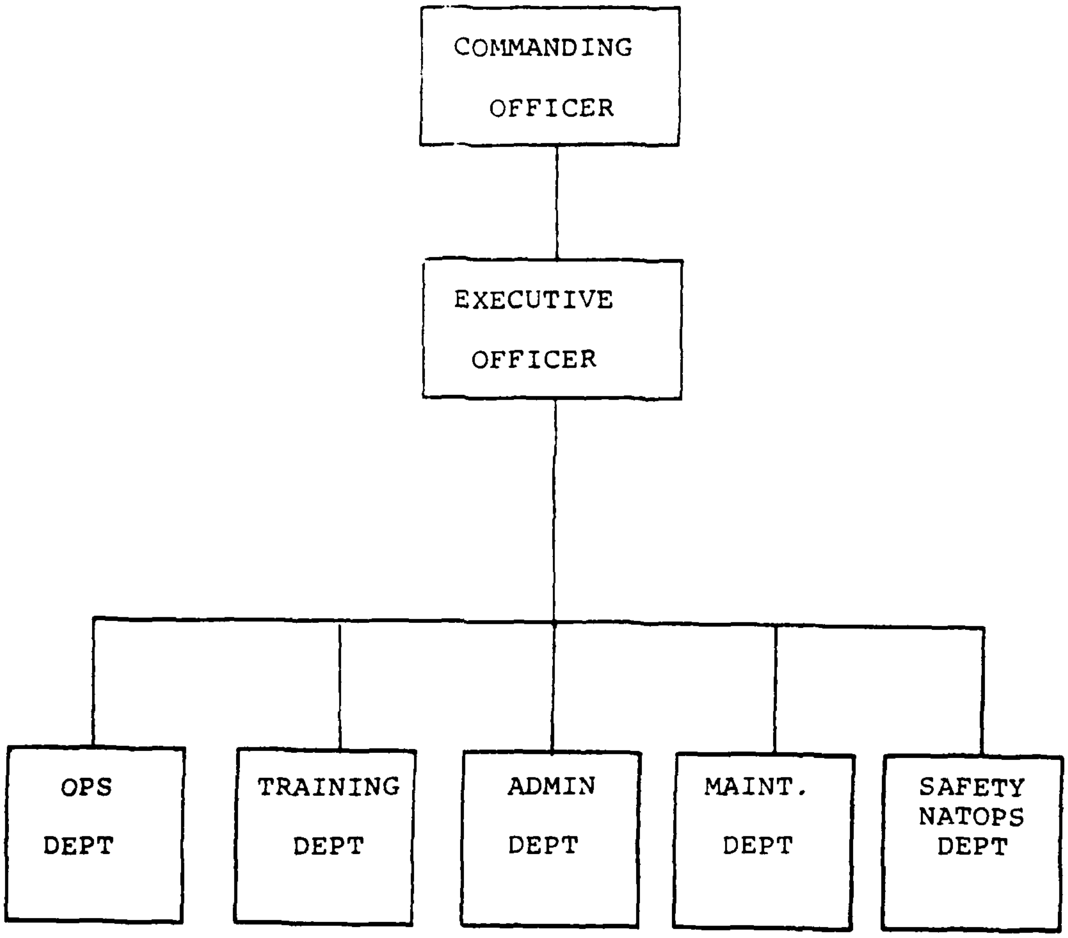


Figure 4.1 Squadron Organization

In some squadrons the Training Department would be a division under the Operations Department and the Command Services division would be a seperate department. The total squadron complement of personnel is 360, with 60 Officers and 300 Enlisted personnel. This chapter will not attempt to provide an in-depth billet description for all 60 Officers, but will describe the major departments and their functional responsibilities and procedures as they exist today.

1. <u>Operations Department</u>

The Operations department is headed by the Operations officer and consist of the Flight, Tactics, Intelligence, and Communications divisions as illustated in Figure 4.2.

In general, the Operations department is responsible for the conduct and documentation of all flight evolutions for the squadron. This includes an extensive interface with the Training and Maintenance departments in order that all resources (personnel and aircraft), are available and capable of carrying out successfully the multitude of assigned tasks.

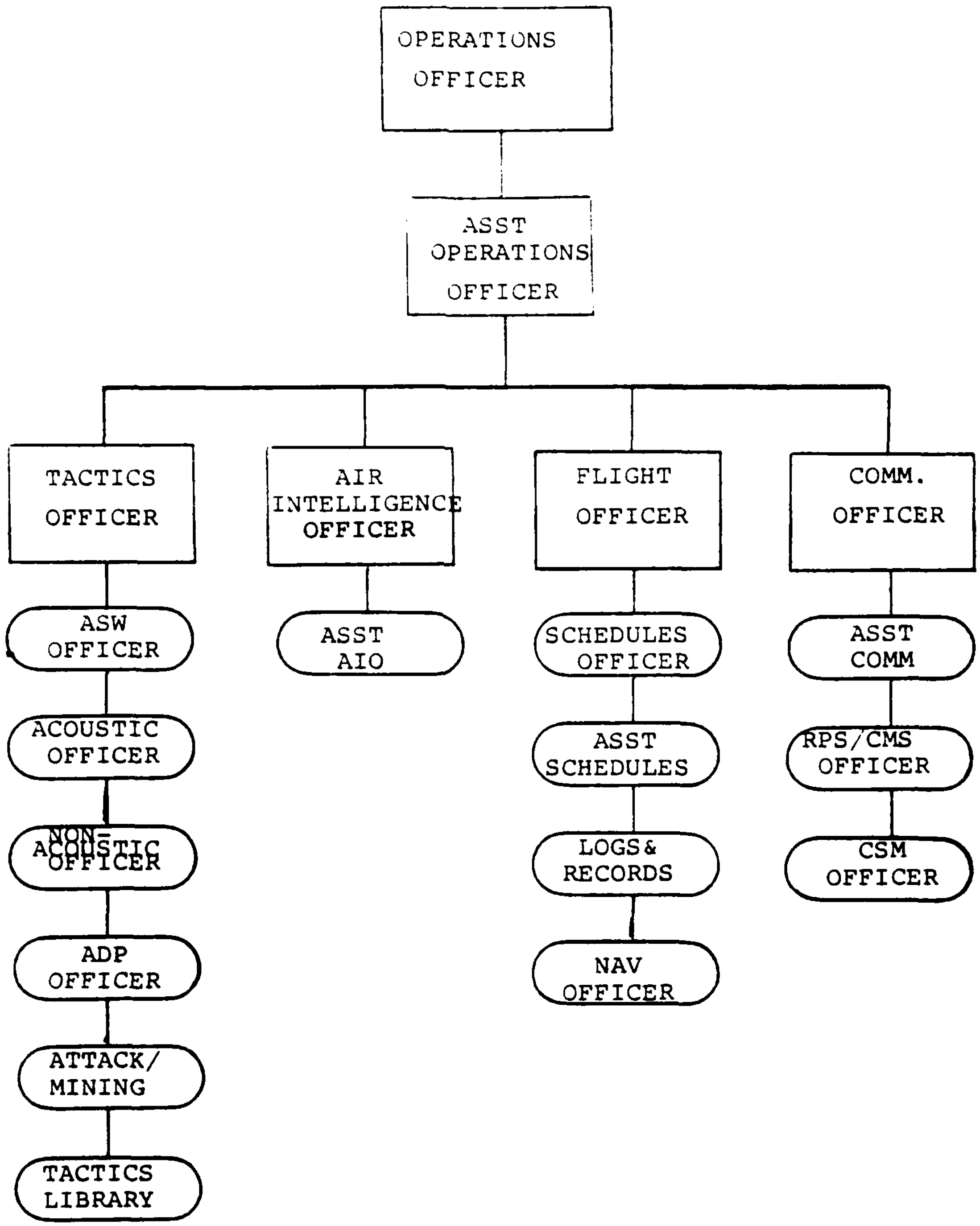


Figure 4.2 Operations Department Organization

The Flight division is responsible for the scheduling of all daily activities including ground training events. It also must insure that the numerous reports/documentation concerning these events are carried out in a timely and accurate manner.

The Tactics division is responsible for the tactical training of all combat aircrew members and the conduct of all fleet exercises and operational flights. The Tactics division interfaces extensivly with the Training department in this endevor and must insure that all crewmembers are kept abreast of current developments in the ASW arena.

The Communications division is responsible for the custody and handling of all classified material and for the proper procedures and protocall in regards to all squadron communications. This includes the filing and logging of hundreds of classified and unclassified messages along with the numerous COMTAC pubs that a squadron is required to have.

The Intelligence division is responsible for the training of all combat aircrewmembers in regards to the numerous intelligence activities that a VP squadron engages in.

2. Training Department

As mentioned previously, the Training Department interfaces extensivly with the Operations department and in some squadrons is organized as a division in the OPS department. In general, the major resposibility of the Training department/division is to supervise the progress of all aircrewmen and to insure that the squadron maintains the highest readiness possible at all times.

A general Training organization as depicted in Figure 4.3, consists of Plans and Readiness, NUC Weapons/Safety, AW Division, and Flight Training.

All training that is accomplished along with all individual and crew qualifications that must be received, must be documented in accordance with Squadron, Wing, and NAVAIR regulations and procedures. This enormous amount of documentation is a necessity in order to track and manage effectivly the readiness and utilization of the dwindling number of squadron personnel resources.

3. Administration Department

The Administration Department as depicted in Figure 4.4, consists of the Department head, Asst. Admin Officer, 1st Lt. division, Personnel Division, Command Services

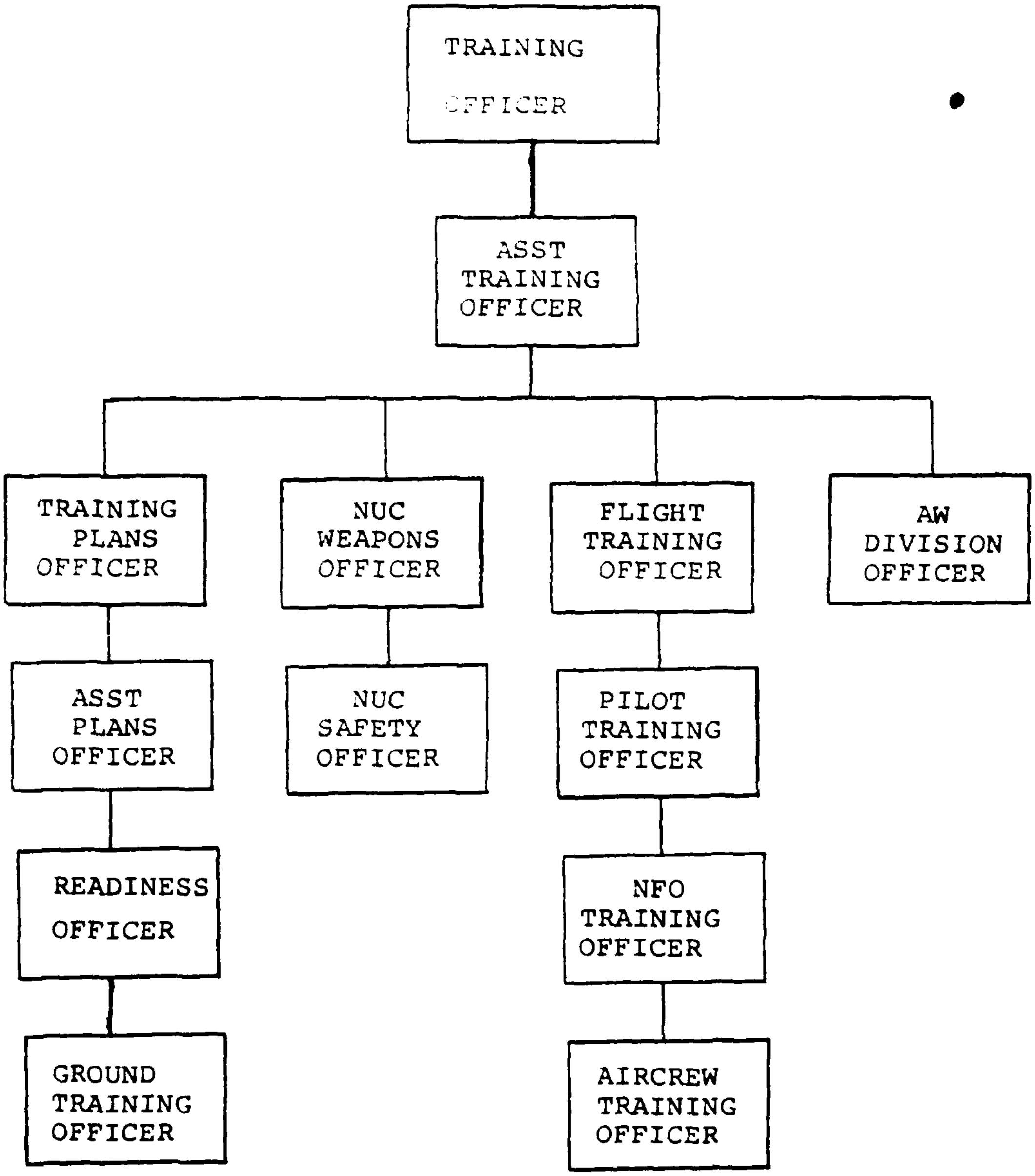


Figure 4.3 Training Department Organization

Division, and Education and Legal Officers. In general, the Admin. Department is responsible for all the routine paperwork and administrative procedures that are common to most organizations. It interfaces with all departments and personnel in the squadron on a daily basis.

The Personnel Division handles all enlisted personnel files and the numerous reports and documentation that is associated with them. The Admin. office,supervised by the Asst. Admin. Officer, handles all Officer files and records. The 1st. Lt. Division maintains all squadron spaces and is responsible for the billeting of all personnel while on deployment and all enlisted personnel residing in the barracks during the at-home period. The Command Services Division has been made a separate department in some squadrons and is responsible for retention and career counseling, Public Affairs, and all social and welfare functions for the squadron.

4. <u>Safety/NATOPS Department</u>

The Safety/NATOPS Department depicted in Figure 4.5, is responsible for both the ground and aircraft safety programs for all personnel in the squadron. This department interfaces extensivly with the Training and Maintenance

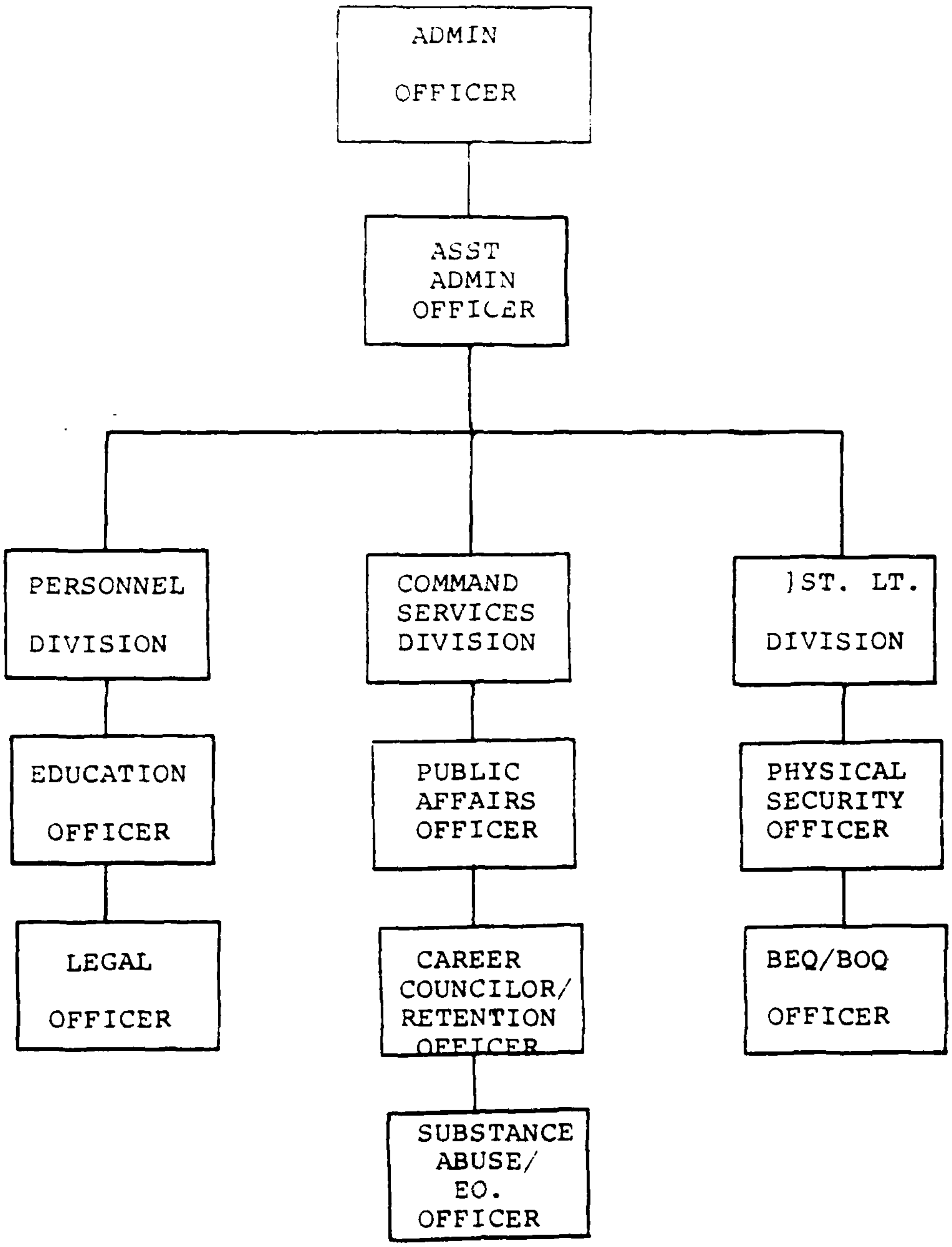


Figure 4.4 Administrative Department Organization

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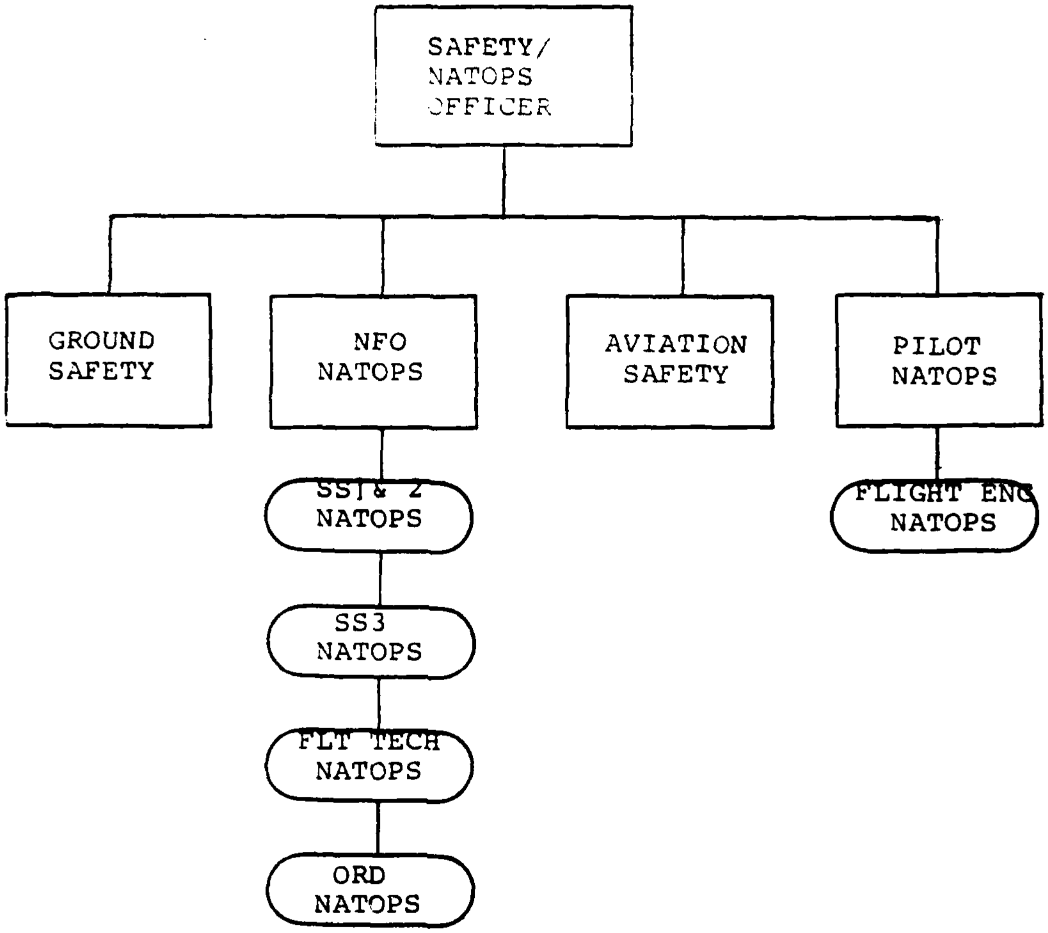

Figure 4.5 Safety/NATOPS Organization

Departments in regards to training all personnel in proper procedures and safety when flying aircraft and maintaining them on the ground.

5. Maintenance Department

The Maintenance Department as depicted in Figure 4.6, is the largest in the squadron in terms of personnel and the handling and responsibility for squadron resources. The Maintenance Department in regards to functions could be considered a self contained organization in itself and has its own administrative and training sections.

In general, the responsibilities of the Maintenance Department is to maintain squadron aircraft and ground support equipment to support day-to-day squadron operations and to satisfy the objectives of the Naval Aviation Maintenance Program (NAMP). The objectives of the NAMP are clearly stated in the promulgating instruction. [Ref. 15]

> "....to achieve the readiness and safety standards established by the CNO, with optimum utilization of man-power facilities, material, and funds. This is to be accomplished through policy guidance, technical direction, management, and administration of all programs affecting activities responsible for aviation maintenance, including associated material and equipment. It encompasses the repair of aeronautical equipment and material at the level of maintenance which will insure optimum use of resources; the protection of weapons systems from corrosive elements through prosecution of an active corrosion control program; and the collection, analysis, and use of pertinent data in order to effectively improve material readiness and safety, while simultaneously increasing the efficient and economical management of human, monetary, and material resources."

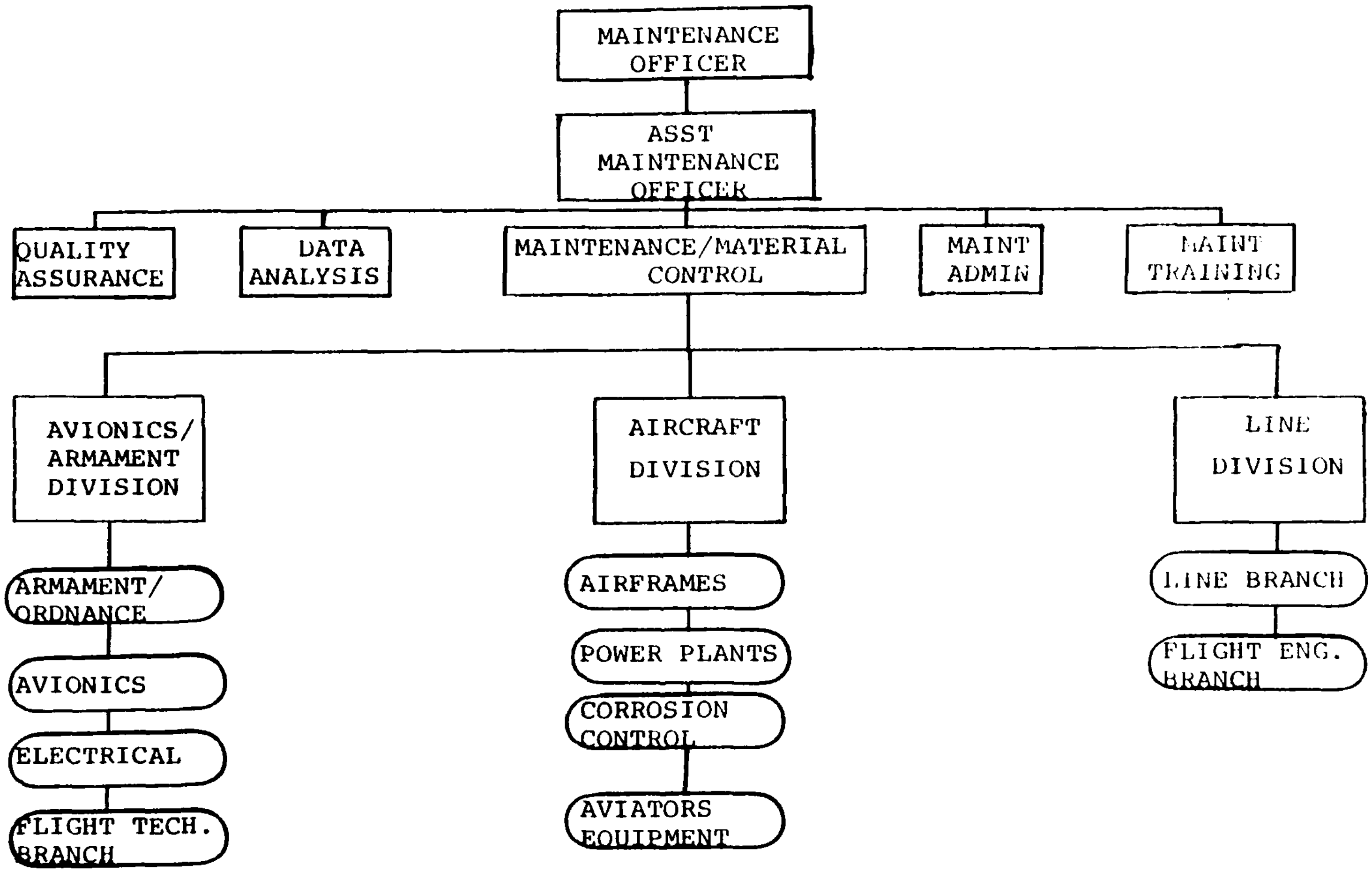

Figure 4.6 Maintenance Department Organization

The squadron level of maintenance (organizational) functions include inspection, servicing, and handling of equipment as well as on-equipment corrective and preventive maintenance including removal and replacement of defective parts and components. Incorporation of designated technical directives and necessary record keeping and reports peculiar to organizational level maintenance are also functions assigned to the squadron maintenance department.

B. CURRENT OPERATING PROCEDURES

Patrol Squadron current operating procedures will be discussed in terms of the management information support that the system currently offers. Gorden B. Davis in his book titled Management Information Systems: Conceptual Foundations, Structure, and Development, stated that MIS structure could be based on organizational function or be based on management activity. [Ref. 16] Management activity refers to the type or level of support that an information system provides,i.e transaction processing, operational control, management control, and strategic planning. This discussion of operating procedures and information flows will be centered around organizational functions of a VP Squadron, but will inherently include different levels of management activity. The organizational functions discussed below closely follow the squadron departmental breakdown and consist of aircraft maintenance management, training management, administrative/personnel management, and operations management.

1. Aircraft Maintenance Management

The squadron maintenance activity in satisfying NAMP objectives and daily operational requirements, performs both scheduled and unscheduled maintenance activities. Scheduled maintenance is composed of inspections (phased, calendar, and special), scheduled removal of components, and technical directive compliance. Unscheduled maintenance are those efforts expended to correct aircraft and equipment malfunctions in order to meet operational and training requirements.

The squadron maintenance department uses the aircraft logbook, aeronautical equipment service records (AESR), technical directives, periodic maintenance information cards (PMIC), and flight activity information to manage scheduled maintenance requirements. Management of unscheduled maintenance is facilitated by usage of the Naval Aircraft Flight Record (Yellow Sheet) and Visual Information

Display System/Maintenance Actions Forms (VIDS/MAF) submitted by flight crew and maintenance personnel.

In the operation of the existing maintenance management system, data is collected on various manual, handscribed forms or grease boards located in the various work centers of the maintenance department. The current status of activity occuring in each of these areas is maintained by positioning these handscribed forms in the VIDS boards or by updating the information on the grease boards.

As mentioned previously, VIDS/MAFS are the main record used to control and monitor the accomplishment of maintenance actions at the squadron level. Part of the form is detachable for insertion in the VIDS boards. The form is used to document on-equipment maintenance as well as the removal and subsequent processing of a repairable component to the Intermediate maintenance level. Subsystem Capability Impact Reporting (SCIR) data is also documented on the VIDS/MAF along with the maintenance action that reduced the mission capability of the equipment. Additionally, technical directive compliance (TDC) and equipment inventory change (gain, loss, and in/out of readiness reporting status) is reported on the VIDS/MAF. A second manually inscribed source document form is the Support Action Form (SAF), used for recording man-hours expended on repetitive, non-repair tasks such as servicing, cleaning, painting ,etc. The handscribed completed forms are submitted to an external local data services unit for processing and the preparation of various reports generated by the Maintenance Data System (MDS). The categories of the reports generated are preventive and corrective maintenance, replacement and repair of defective components, changes to equipment configuration, material transactions, and aircraft/GSE Subsystem Capability Impact Reporting.

Configuration management at the squadron level involves tracking selected components installed in individual aircraft and maintaining accounting of technical directive compliance requirements and actions. Updated technical directive lists 2 (not incorporated) and 4 (incorporated) are prepared and forwarded by the Naval Aviation Logistics Center (NALC) on quarterly basis to the individual squadrons for verification and correction. The lag in the Technical Directive Status Accounting is from one to two months and the updated lists received by the squadron are neither accurate or timely enough to enable effective configuration control. Numerous manhours are spent by squadron maintenance personnel to verify actual configuration against the lists and technical directive documents. The time lag in the system results in additional submission of VIDS/MAF's to insure that previous incorporations are entered in the data base.

The present information flow that originates from the submission of a VIDS/MAF in maintenance control is depicted in Figure 4.7.

As can be seen, there are numerous verification and manual transfers of the various parts of the VIDS/MAF. The probabilities for loss/misplacement of this record are high along with the redundant duplication and recording of data items contained in this manual record.

Flight activity information and tracking originates from the Naval Flight Record (Yellow Sheet - OPNAV Form 3760/2B). Information concerning aircraft flight time and individual crewmember flight time is handwritten by flight crew and delivered to maintenance control for data collection. This data is used by maintenance personnel to schedule maintenance relative to flight hour intervals and

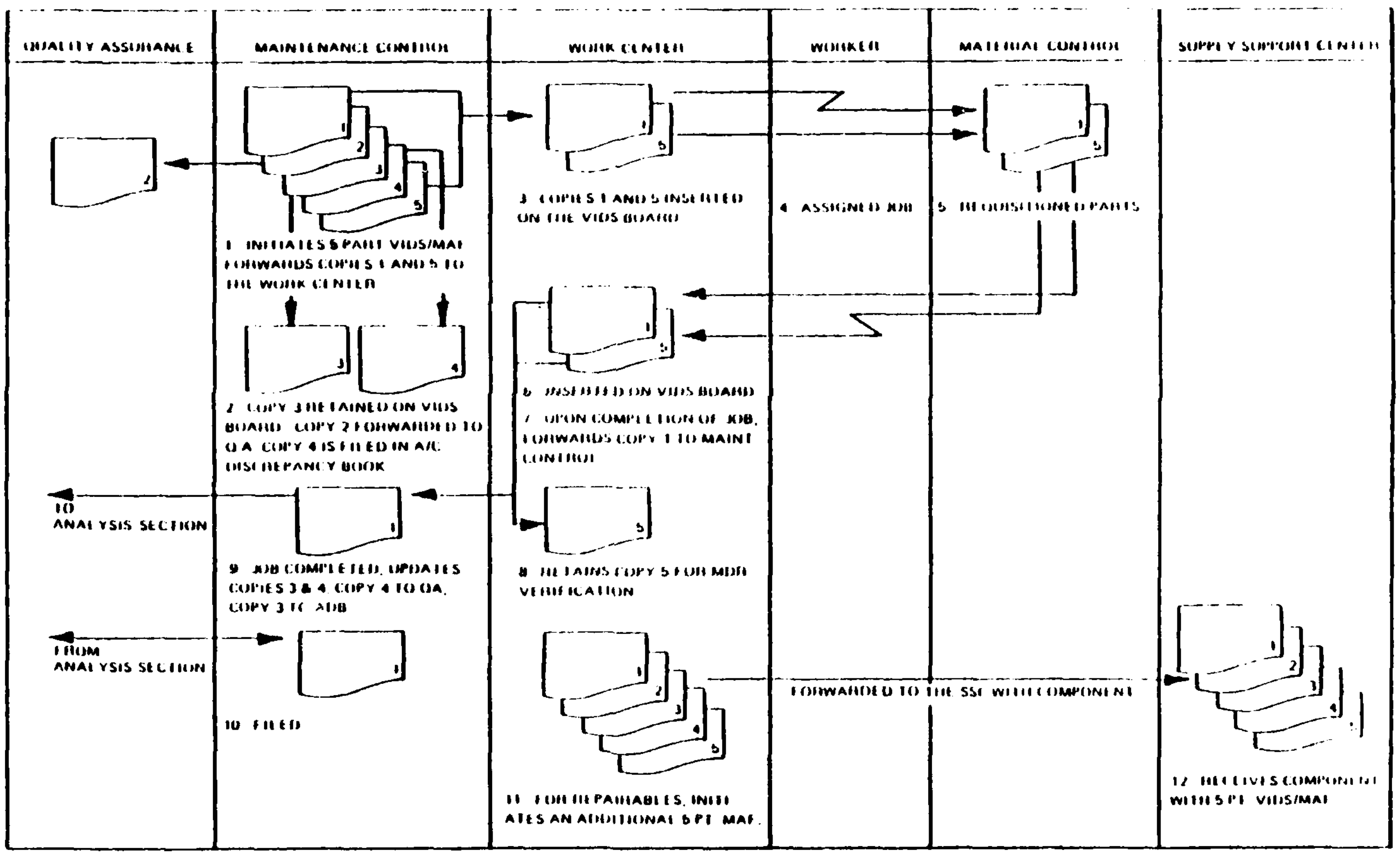

Figure 4.7 Squadron VIDS/MAF Information Flowchart

to keep track of where a specific aircraft is in the maintenance cycle. The data flow originating from the Yellow Sheet is depicted in Figure 4.8.

The information contained in the yellow sheet is transcribed numerous times for varying applications and records. The squadron maintenance activity keeps locally prepared daily time sheets for data entry from each completed yellow sheet. Entries are added or subtracted from cumulative totals, recorded as dailey totals or single sorties, or brought forward from previous time sheets. Extensive verification procedures are required due to numerous records, files, and status boards that use the information derived from the yellow sheet.

2. Training Management

The execution and management of training crosses all departmental boundries and affects all personnel in an Operational Patrol Squadron. There are approximately 10 combat aircrews in a typical VP Squadron with 12 crewmembers per crew. Thus, 120 squadron members are involved in aircrew training alone. In addition all maintenance personnel must be trained in order to accomplish certain tasks required of specific work centers. Although there is

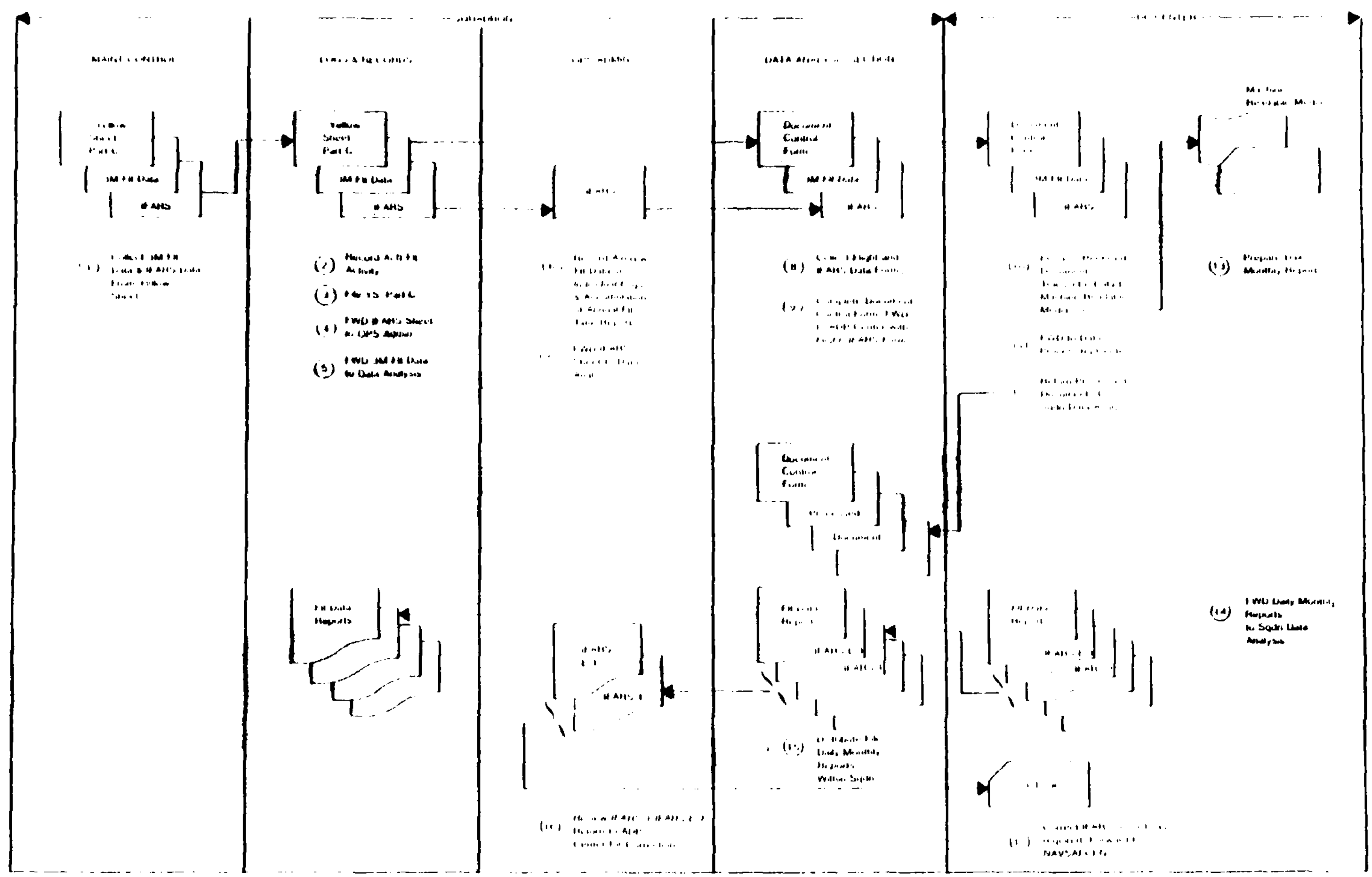

Figure 4.8 Flight Data Collection Information Flow

a designated Training Department or Division in the squadron organizational structure, training is also enacted and managed by other functional areas in the squadron. Training is required to prepare all Officers and Enlisted personnel to fill certain ground jobs or billets in a squadron in addition to Safety/NATOPS training, tactical training, general military training (GMT), substance abuse training, etc.

One of the main objectives of an Operational Patrol Squadron during peacetime is to maintain the highest degree of readiness possible at all times. The primary means for accomplishing that goal is through continous and effective training. Thus, training equates to readiness and a high degree of readiness depicts an effective training program.

As mentioned previously, the majority of the training that a crewmember receives in order for him to qualify for a specific position on the P3 aircraft is accomplished in the operational squadron after he completes the sylabus at the Fleet Replacement Squadron. This does not mean that the FRS is ineffective . The FRS is designed to provide indoctrination and initial training to the first tour aviator and refresher training to the second tour aviator. It normally takes from 1 to 2 years of additional training after the three to six months at the FRS to fully qualify the first tour aviator at his final combat aircrew position. The reason for the lenghty time of additional training in the operational squadron is that the officer crewmembers must have a knowledge of all 12 crew postions in this complex aircraft. The following discussion will describe the current procedures utilized to manage and track the training activities in the operational Patrol Squadron.

Current tracking of training progress for air crewmembers involves numerous manual records and files and the ever present manually updated grease board or chart. A training jacket is maintained for each of the 120 air cremembers and updated by the respective NFO, Pilot, or Enlisted Aircrew Training Officer. In addition, the respective NATOPS Officer or Petty Officer maintains a seperate file on all flight personnel to track and record their progress in relation to NATOPS exams and inflight checkrides.

All squadrons have a standard training syllabus for aircrew based on the Personnel Qualification Standards (PQS) system. This system consists of numerous training objectives that must be successfully completed and consist of both practical factors and flight evolutions. Each of these pratical factors must be signed off by a qualified instructor in a student logbook and on a student gradesheet and then transcribed again in the individuals training jacket. This redundant recording of information is extremely time consuming and subject to errors. The progress of each crewmember under training is plotted on a greaseboard from information obtained from the PQS logging and filing procedures. This information is used by plans and schedules officers to determine the next sequence of flight evolutions for a specific individual. The training progress of an individual is also used by the Operations department in determining crew composition and crew manning projections in addition to monthly readiness and training reports sent to the functional wing. Thus it can be seen that an extremely accurate data base is needed concerning training tracking and the present manual method of maintaining that data base is time consuming and error prone.

NATOPS training is another area that maintains extensive records and files pertaining to individual qualifications and deficiencies. Flight crewmembers are not legally qualified to perform as a functional crewmember unless they hold a current NATOPS qualification. Maintaining current NATOPS qualifications requires successful completion of both open and closed book NATOPS exams and a NATOPS flight check. Extensive NATOPS questions banks must be manually maintained and updated for eight crew positions; Pilot, Tacco, Nav/Com, Acoustic Sensor Operator, Non-Acoustic Sensor Operator, Flight Engineer, Flight Tech., and Ordnanceman.

All of the manually maintained records, files, and question banks mentioned above in regards to training management require numerous man-hours that could be used for individual counseling and personalized training.

3. <u>Administrative/Personnel Management</u>

The current procedures in the functional area of Administration and Personnel management require numerous clerical man-hours to produce and edit the many reports, files, and evaluations required of any squadron in the U.S. Navy. Operational Patrol Squadrons, as of this date, do not have any word processing capability to aid in this process.

As mentioned previously, the Personnel Division handles all Enlisted personnel records. This is an extremely large file or manual data base from which numerous summaries, reports, and lists must be assembled or manipulated. Some Operational VP Squadrons do make use of the ATSS Personnel module to a limited extent when they are not deployed and are home-based at either NAS Moffet Field or NAS Jacksonville which have ATSS equiped FRS. This limited support must be severed when the squadrons deploy and all automated personnel functions must be returned to the manual data base. It therefore requires the squadron to maintain both a manual personnel data base and the ATSS personnel data base (if desired) in order to prevent a complete reconstruct when required to deploy.

Watch lists, recall bills, duty section rosters, BEQ billeting assignments, social rosters, etc, are examples of the numerous applications that must be manually produced and maintained from the personnel data base in addition to the personnel resource data such as NEC codes, gain and loss accounting, time-in-rank, and time-in-service that is a necessity for advancement and overall squadron management. All required reports, both internal and external to the squadron, are managed by a manually maintained and monitored "tickler file". The reports that are produced have to be typed in the rough, and then chopped and edited numerous times before the report is authorized to leave the squadron. This results in numerous clerical man-hours typing and re-typing documents before they are sent out. The manual tickler file and the manually produced documents not only increases man-hours but affects the timeliness of the reports as well.

4. <u>Operations Management</u>

The function of Operations management is one of the more critical management areas in the squadron. Meeting committments and producing quality results are extremely important and "visible" objectives of any squadron. Current procedures involving operational control receive little, if any, automated support. Some squadrons do make use of the ATSS in producing crew lists but that is just one small application or output of the Operations management function. Operational control involves day to day scheduling, short term and long term planning, resource inventory control, and up-line reporting and documentation.

Daily flight scheduling is currently accomplished using manually produced weekly and monthly ops and training plans, personnel availability lists, and Wing tasking requirements. All of these manual inputs must be balanced and weighed against each other in order to derive the most optimum schedule possible. This manual process often is subject to human error and poor input data that results in numerous flight schedule conflicts.

The yellow sheet, discussed previously under Maintenance management, is also used for operational control of flight hour usage and individual flight hour accounting and recording (IFARS data). The data obtained from the yellow sheet is transcribed again into individual logbooks and on computer input forms for processing at an external activity. A single automated entry of yellow sheet data would alleviate the many mistakes and omissions that result from the redundant and repetitive procedures that currently exist.

Current procedures utilized to track sonobuoy usage involves manual reccrding of flight summary data and periodic physical counting of exisiting sonobuoys both on aircraft and in sonobuoy stowage bins. Numerous man-hours could be saved if a single source data entry procedure could be utilized to track and report these assets.

Up-line management requires both periodic and one-time status reports. The current procedures utilized to summarize and format the data required in these reports involves numerous personnel, man-hours, and manually recorded reports and files to produce the desired output. An automated data base and report formatter would greatly reduce the enormous amount of effort in producing these reports as well as improve their accuracy.

C. CHAPTER SUMMARY

This chapter summarized current Patrol Squadron organization and operating procedures concerning Maintenance, Personnel/Administrative, Training, and Operational management. This is a necessity in any feasibility study in order to determine and identify any deficiencies that might exist in a particular system. The deficiencies that were identified in this chapter will form the basis for stating the functional requirements that a Patrol Squadron Management Information System should satisfy.

V. PATROL SQUADRON REQUIREMENTS AND ALTERNATIVES

A. INTRODUCTION

A cursory analysis of the present patrol squadron information system and its deficiencies indicates that it is extremely laborious and time-consuming. It is characterized by numerous handwritten source documents; nonstandard data collection and recording of information; completely manual procedures for operational control, training support, and personnel support; and an outdated data processing capability, external to the squadron, for processing maintenance data.

Output from the current system is neither timely nor sufficiently comprehensive for squadron commanders to remain abreast of the broad spectrum of squadron information needs. Supplemental information requests by higher commands result in further manual data manipulation, additional workload burdens, and reduced mission effectiveness.

Constrained decision making, that occurs due to the lack of timely information required to support patrol squadron operations, is the ultimate result of current procedures. This situation will deteriorate further because of increasingly sophisticated weapons systems and the expanded data requirements needed for effective management control. [Ref. 12]

As mentioned in Chapter Three, it is imperative that decision makers within the Patrol community begin to look more and more closely at Patrol Aviation information systems with an eye for change. Future capabilities and performance will be affected greatly by developments occurring now and in the coming months.

Therefore, prior to a decision to develop a new system or to modify an existing one, functional requirements of the user should be determined. These requirements should be general in nature, but should completely cover all phases of Patrol Squadron operations. This chapter is designed to present the reader with a good understanding of what a Patrol Squadron MIS should do, and from that analysis, present feasible alternatives for the future. New system benefits and the costs of subsequent project phases are highly dependent on the validity and accuracy of the requirements determination. Likewise, the quality of alternatives developed to meet the requirements is subject to the correctness of the functional requirements.

B. GENERAL FUNCTIONAL REQUIREMENTS

Chapter Four reviewed existing methods and procedures, and concluded by describing functional activities which exhibited management information deficiencies.

In order to satisfy the cited areas of deficiency, by developing meaningful requirements, it is critical that the analysis of these requirements be based on direct contact with users. Both authors have had recent operational tours in Patrol Squadrons. This experience has been invaluable in relating to individual squadron personnel as well as to developmental personnel in various program billets.

The functional requirements discussed in this chapter are a product of both research and experience. The authors' recent managerial experience in Patrol Squadron operational control, aircraft maintenance, training, and administration, and the perceptions developed and lessons learned from this experience, were important factors in the determination of requirements. These necessary, although probably not sufficient, past experience and perceptions can be supplemented greatly by current analysis. For this reason, It was determined that specific squadron operations should be examined with specific deficiencies in mind.

Patrol Squadron Forty Seven, located at Moffett Field Naval Air Station, was visited on August 17, 1981. The objectives of this research trip were:

1. Determine current squadron organizational structure and practices.

2. Develop valid requirements for input, retained data, and output as compared to those determined for Tactical Aviation squadrons in the PLS System Decision Paper, and as determined by current patrol squadron procedures.

3. Investigate additional areas of application for automated information systems in patrol squadrons, based on the perceptions of current squadron personnel.

The outcome of the squadron visit was most positive. Patrol Squadron Forty Seven proved to be most receptive host, and more importantly, provided valuable data for analysis.

Due to the fact that VP 47 is located at Moffett Field, which has an ATSS capable FRS resident, its information processing capability, however limited, is typical of the best available to VP squadrons. Through the limited use of ATSS resources, personnel in the squadron have become aware not only of the potential of automated information systems, but also of the frustration that can occur from limitations imposed on facilities and on squadron usage.

Interviews were conducted and data was collected in the functional areas of operations management, maintenance management, training management, and personnel/admin management. Typical system workload requirements were obtained in the form of primary inputs, outputs, and retained data. These charts assist greatly in translating manual functions into automated information system processing requirements. Appendix A contains the estimated system workload charts, which are similar to the charts developed in the PLS paper for TACAIR squadrons. Based on this research, the functional requirements which follow are intended to satisfy patrol squadron information needs for the forseeable future.

1. Maintenance Management Requirements

In order to provide sufficient support to the management of maintenance data, any Patrol Squadron information system should provide the following functional capabilities.

1. Improve planning and execution of scheduled events such as phased inspections, time limited component replacements, and technical directive compliance.

2. Reduce the effort in collecting, converting, and analyzing flight activity and configuration data required by up-line management and the cognizant field activities for aircraft and engines.

3. Eliminate manually maintained local forms for flight activity records concerning aircraft and equipment. This should include automation of the Naval Aircraft Flight Record (yellow sheet), VIDS/MAF, and SAF.

4. Automate the AIMD interface for equipment repair/supply tracking.

5. Provide close, continuous monitoring of the availability, status, and usage of all assets.

6. Improve squadron maintenance participation, as reporting custodian, in the configuration management process.

7. Provide more timely control of configuration data by tracking configuration baselines in near real-time.

8. Improve maintenance decision efficiency by providing rapid access to a composite bank of aircraft/engine and component compatibility data.

9. Reduce aircraft/system damage occurences relating to the aircraft configuration management system.

10. Provide consolidation of information with operations, training, and personnel/administrative functions, in order to reduce redundancy and duplication of effort. This includes flight hour accounting data and aircrew utilization for the Operations Department, personnel qualifications/status for the Administrative Department, and numerous plans, reports, and schedules for the Training Department.

2. <u>Operations Management Requirements</u>

Management of squadron operations requires a myriad of skills, procedures, and information needs. The following functions are essential elements of an effective Patrol Squadron information system.

1. Provide data concerning present and future requirements, physical assets, personnel, and training in order to plan long term commitments as well as to produce daily operational schedules.

2. Provide timely, reliable data management information for unit and Wing Commanders.

3. Provide yellow sheet flight data management and logging.

4. Track and summarize OPTAR and TEMAD funds, ordnance allocations, and expenditures.

5. Track and control sonobouy inventory and usage.

6. Maintain current flight hour accounting (glidepath) data, for use in operational planning as well as reporting.

7. Provide access to, and analysis of, readiness figures and trends.

8. Provide dissemination of operational plans, schedules, reports, and actions to other functional areas in the squadron.

3. Training Management Requirements

Patrol squadron training is more extensive, more time consuming, and requires more resources than training in most aviation squadrons due to mission complexity, cross training considerations, and crew size. Due to these factors, the management of training and training information is critical to the successful execution of the VP mission. The following functional capabilities are required for optimum squadron performance.

1. Eliminate from the planning and decision making processes the problems associated with the use of inconsistent and incomplete training data by providing a means of preparing and presenting training information in a uniform manner.

2. Reduce the time and volume of information required to make training decisions by reporting to each level only necessary degrees of detail and, when appropriate, only the exception from the stsndard or norm.

3. Permit consideration of the effect of a decision in advance by supplying complete, accurate, and timely training data for use in the planning and decision making process.

4. Schedule training resources (aircraft, classrooms, simulators, trainers, personnel, etc.) to meet total training requirements and priorities.

5. Schedule training to minimize consumption of resources.

6. Enable the use and update of a prepared question bank for generation of testing materials.

7. Support individualized instruction by allowing modification of standard syllabus.

8. Enable authcrized personnel to author, edit, review, and update all training related materials.

9. Generate student gradebooks to track each aircrew members progress through his training syllabus.

10. Maintain data on military education and advancement. Included in this area are school and qualification records, individuals' advancement requirements and progress, etc..

4. <u>Personnel/Administrative Management Requirements</u>

Effective squadron management is facilitated only by a tremendous amcunt cf emphasis on administative functions and how they relate to squadron personnel. This critical area of squadron performance crosses all departmental lines and affects all squadron functions. The following requirements are necessary for the efficient and effective management of personnel/admin functions.

1. Improve the timeliness and data quality of up-line reports while reducing the man-hours required for report preparation.

2. Provide word processing capability, including output of routine reports, letters, instructions, etc.

3. Facilitate efficient management and control of military duty and its associated accountability through the maintenance of watch bills, duty section lists.

4. Track personnel resource data, such as Naval Enlisted Classification codes (NEC), gains and losses, time-in-rank, time-in-service, etc..

5. Summary

The functional system/user requirements that have been developed are certainly not exhaustive, but are, as desired, more general in nature. They do, however, cover the entire functional range of activities that a patrol squadron engages in. This straightforward approach to requirements determination has produced the functional criterea necessary for comparison between alternatives.

C. ALTERNATIVE DEVELOPMENT AND REVIEW

1. Assumptions

Prior to the statement, discussion, and comparison of alternative courses of action that confront decision makers, it is necessary to illuminate a few assumtions on which the analysis of these alternatives are based.

First of all, it is assumed that Patrol Squadron organization and procedures do not differ significantly from squadron to squadron, and that the squadron mission will not change in the near future. This assumption is, of course, necessary in order to consider any MIS responsive to the needs of the entire community. In fact, instituting a MIS in all squadrons will reinforce this assumption, in that it will encourage community-wide standardization of procedures.

Secondly, system operational life is assumed to be independent of any system developments currently ongoing, and is estimated to parallel the life expectancy of other Navy general purpose ADP.

Additionaly, in order to fairly state all alternatives, it is assumed that political and regulatory considerations are not considered. Only after all feasible alternatives are examined will these factors be counted.

As squadrons move between sites, the MIS must appear identical to the user. Information must be transferable between sites in machine readable form. Therefore, it is assumed that system compatibility is essential to alternative development.

The ability for the system to fail soft is another assumption that is made. Even though the probability of an intermittent system or power failure is low, the system must not preclude the return to manual modes.

Finally, system uniqueness is not an aim or an assumption relagated to Patrol Squadron MIS development. Any system satisfying the functional requirements will be considered, whether or not it was designed specifically for the Patrol Community. In the same light, if uniqueness is necessary to meet the needs of the community, then existing alternatives must give way to new ideas.

2. Statement of Alternatives

Stating alternatives to meet the functional requirements, assumptions, and user preferences can now be undertaken. The development of these alternatives should focus on the degree of improvement that would be possible from the implementation of a particular system. System costs are, of course, as important as system benefits, in most cases. This case is no exception, but before any cost factors can be considered, the relative capabilities of the alternatives must be reviewed and compared.

The capability criteria from which comparison can be made are listed below:

1. Management effectiveness/efficiency
   a. Maintenance management functions
   b. Operational management functions
   c. Training management functions
   d. Personnel/administrative functions
2. Vulnerability
   a. Security
   b. Communications
   c. Data backup

3. System compatibility

a. Interface with other systems

b. base/deployment compatibility

4. Portability

In an attempt to identify methods to meet the desired capabilities of a Patrol Squadron MIS, the following alternatives have been developed. The statement and explanation of these alternatives is intended to provide the reader with an understanding of each proposal, and provide a framework from which comparison can be made.

Alternative 1 - Continue with current methodology

Alternative 2 - Expand existing ATSS resources

Alternative 3 - Adapt NALCOMIS to satisfy VP needs

Alternative 4 - Initiate development of a completely new system

Alternative 5 - Implement enhanced PLS (mini-ATSS) in patrol squadrons

a. Alternative 1

The current squadron organization and procedures, as decribed in Chapter Four, have evolved over the years into a system of manual data entry, transcription, and research tasks. The continued growth in data generation and reporting requirements will further decrease squadron management efficiency, relative to the current situation.

An attempt to improve the current system by further evolution or streamlining of manual procedures will not produce significant results. Manual tools are limited in environments requiring more data and near real-time responses to inquiries. [Ref. 17] Additional personnel could accomodate a growth in data processing requirements, but that is not a plausible solution in today's environment. Personnel resources are in short supply in the Navy, and the requirement for more personnel support could mean less personnel available for operational assignment.

This alternative assumes that word processing capabilities are available to VP Squadrons at present. Some squadrons have obtained, or will obtain, word processing equipment to handle routine correspondence, reports, and instructions. Even with this capability, the bulk of squadron functional requirements, outside the area of administration, are not met.

b. Alternative 2

The alternative to expand existing ATSS resources into Patrol Squadrons was recommended, in concept, by Naval Audit Service auditors. [Ref. 4] This action, if taken, would only partially meet the requirements of the squadrons. They would be provided full functional capability during at-home periods, but upon deployment would be severed from any automated information capability. Even during at-home cycles the availability and capability of the ATSS system would be limited and controlled by a centralized facility. With limited control, system vulnerability would be affected. Although data backup could be maintained, security of squadron files would be questionable, and communication interruption would be more probable.

This alternative would require a great deal of additional hardware, not only to provide squadrons with input/output capability, but also to maintain responsive processing performance.

Due to the non-portability of existing ATSS systems, base/deployment compatibility of information processing procedures would be non existent. Only by future expansion of ATSS to all deployment sites could this compatibility be achieved.

For these reasons, this alternative is not acceptable.

c. Alternative 3

If NALCOMIS Module 1 development is continued as currently planned, it is feasible to consider the sharing of these resources, adapting the system to meet VP needs.

The current objective of the NALCOMIS Module 1 concept is to provide local maintenance and material managers at the OMA, IMA, and SSC levels with a modern, responsive management information system. As envisioned, it will easily meet the maintenance information requirements of a patrol squadron. Also, the personnel/administration functional capabilities are present, but would require extensive modification. Unfortunately, applications are not planned in the areas of aircrew training and operational control.

It is certainly within the potential of NALCOMIS' planned hardware to meet Patrol Squadron needs, but the additional training support, operational management, as well as additional personnel/admin application software would require expensive, time-consuming development. Additionaly, as pointed out in Chapter Three, the extremely slow implementation schedule of NALCOMIS is contradictory to the basic underlying need of the Patrol Community, which is a timely solution to its information needs.

Future NALCOMIS development will further dictate whether the feasible application of this system to VP requirements is possible. Current political and economic factors will have a huge impact on the course of NALCOMIS Module 1 development, and could force modification to accomodate other applications. At present, however, system design does not support compatibility with existing VP systems, and if implemented would be plagued by problems involving information portability and communications complexities.

Due to these factors, this alternative is considered unresponsive to Patrol Squadron requirements.

d. Alternative 4

Original development of a system designed to specifically address Patrol Squadron requirements is presented to ensure that no stones are left unturned in determining decision alternatives available to community leadership. The feasibility of this alternative is based on the fact that new system developments can be tailored to meet practically any set of requirements. The cost of this alternative, in terms of time and money, is a function of the extent of compatibility the system will have with existing Patrol Community systems.

System developments included in this concept could range from a small personal microcomputer with homegrown software and virtually no compatibility with existing systems, to a NALCOMIS-like development which would be completely compatible with all community systems, but would require multi-year development and prohibitive funding requirements.

It is beyond the scope of this study to identify specific new system designs. Presentation of this alternative does, however, show that new development is feasible. Further investigation of new development should only be undertaken if it is determined that no existing developments or systems can be utilized. This determination could save commanders lengthy system development time and could avoid the cost of this development.

e. Alternative 5

The Portable Logistics System, as explained in Chapter Two, meets individual Patrol Squadron requirements in all categories of system vulverability, compatibility, and portability. By adding additional ATSS software modules, which are already developed and tested, to the PLS hardware configuration, the functional categories of operational management, training management, and personnel/administrative management can also be satisfied.

This concept will permit individual squadron commanders to operate individual, fully capable, turnkey systems at any base or deployment site, while providing for compatibility and interface with both existing ATSS sites and operational maintenance systems.

One of the greatest advantages of this alternative is the fact that virtually no hardware or software development is required. ATSS software has been run on proposed PLS hardware, and has handled squadron workload. [Ref. 18]

This alternative fully meets the criteria set forth by the definition of requirements, and should be considered most responsive to the needs of the Patrol Community.

3. Comparison of Alternatives

a. Benefits

The alternatives that have been presented represent a wide range of conceptual designs. The capability criteria that were used to establish the feasibility of each of the alternatives are an excellent means of comparing the benefits of the different ideas presented.

Table 2 illustrates the relative responsiveness of each alternative when compared on the basis of system objectives. Each alternative is judged in terms of the individual objective areas and indicated by an "X" in the tabular matrix if it fully meets the individual requirement. If the alternative only partially satisfies an individual capability, a "P" is indicated in the matrix. The areas that are not satisfactorily addressed or satisfied by the alternatives are left blank in the matrix.

Examination of the table shows clearly which alternatives will meet the objectives established by the system requirements of the user. Alternatives Four and Five are the only proposals which fully satisfy all objectives.

Since further differentiation between alternatives cannot be gained from analysis of requirements, other criteria should be addressed. The development of requirements and alternatives has, by design, not addressed the life cycle costs (LCC) or environmental (political and regulatory) considerations associated with each feasible alternative. This was done to ensure that the most

TABLE II

ALTERNATIVE COMPARISON BY SYSTEM OBJECTIVES

	MANAGEMENT FUNCTIONS				VULNERABILITY			COMPATIBILITY		PORTABILITY
	MAINT.	OPS.	TRAINING	PERS/ ADMIN	SECURITY	COMM. INT.	DATA BACKUP	BASE/ DEPLOYMENT	INTER-FACE	
ALTERNATIVE 1				X	X	X	X	X	X	X
ALTERNATIVE 2	P	P	P	P	P		P		P	
ALTERNATIVE 3	X			P	P		P	P		
ALTERNATIVE 4	X	X	X	X	X	X	X	X	X	X
ALTERNATIVE 5	X	X	X	X	X	X	X	X	X	X

beneficial system concept could be envisioned without economic or environmental contamination. The results of this sterile analysis have produced two feasible alternatives whose benefits, when examined in the light of real world constraints, are counter-balanced by factors of the economy and the environment.

b. Costs

A rigorous cost-benefit analysis comparing Alternatives 4 and 5 would not be realistic, and therefore not very beneficial, at this conceptual stage of analysis. Some factors of cost can, however, be addressed in order to more strongly support the feasibility of either alternative.

If Alternatives Four and Five are examined in terms of life-cycle costs, it is possible to visualize a large cost differential between the two. This can even be accomplished without specifically defining what type of system Alternative Four would entail.

With the declining or stabilized hardware costs present in the ADP industry today, this factor cannot be considered too heavily. Even so, it is inconceivable that a newly developed turnkey system, meeting VP squadron needs, could be produced any more cheaply than the cost of the proposed FLS (mini-ATSS) hardware, which is presently estimated at less than $23,000.

Software development is becoming more and more costly, entailing up to 80% of system development costs. [Ref. 19] Alternative 4 would require a full development effort, whereas, Alternative 5 would require only minor modification to existing ATSS software. This is a significant difference between the two feasible choices.

Software maintenance is another critical life-cycle factor whose cost should be considered. Either alternative will require maintenance of system and applications software. ATSS software has, however, been evolving for almost ten years. It has been constantly tested in an operational environment and has performed well. Newly developed software would be untested, and even if reliable from the start, would require no less maintenance than existing programs.

Other life-cycle costs, including site preparation, implementation, user training, and hardware maintenance must be considered fairly equal between alternatives as well.

Because of the life-cycle estimates, Alternative 5 is considered a considerably more desirable developmental path.

c. Environment

Chapter Three discussed political and regulatory considerations at length. Comparing alternatives in these terms is extremely difficult due to the uniqueness of each ADP acquisition. A decision to pursue Alternative 4 would, of course, require a full developmental effort. Only through a detailed analysis of this particular concept could an acquisition strategy be proposed. The PLS (mini-ATSS) concept has, however, been evolving over a two year period. Its applicability to Patrol Aviation has been completely ignored until now. As mentioned earlier, the political environment surrounding ADP procurement, especially in Naval Aviation circles, is very dynamic. The Reagan administration has stated its interest in simplifying the systems acquisition as well. Thresholds for purchase of non-tactical systems with Type Commanders' Operation and Maintenance (O&M) funds are evolving, which could make it possible for operational units to acquire the needed systems. What is critical in examining the environmental factors affecting a given alternative, is that if the alternative is most feasible in terms of its cost effectiveness, it should be pursued in a whatever manner possible, regardless of the current political or regulatory situation.

D. CHAPTER SUMMARY

The development of an enhanced version of the Portable Logistics System, which the authors refer to as "Mini-ATSS", has evolved from this chapter as the most feasible, logical, cost-efficient method of filling the information system void existing in the Patrol Aviation Community. This developmental path is based on satisfaction of the user/system requirements that were developed. The requirements established in the chapter were developed from data and perceptions obtained from squadron personnel currently involved in the operational environment as well as from the experience and perceptions of the authors. These requirements are the building blocks from which any squadron system must be derived, and should be refered to constantly, no matter what developmental path is eventually chosen.

VI. CONCLUSIONS AND RECOMMENDATIONS

The Patrol Aviation Community has not fully recognized the need for automated management information system support at the squadron level. Reviewing historical and current MIS development in Naval Aviation has shown that technologically, the decision by commanders to obtain automated information resources to assist in management is well overdue. Feasible systems have been proposed, developed, and implemented in some sectors of Naval Aviation, but have, thus far, excluded Patrol Squadron applications. This is partially attributable to current political and economic factors, but is also a function of Patrol Aviation's inattention to the problem.

Current squadron organization and procedures are plagued by information deficiencies in almost all functional areas. These deficiencies translate into a valid need for automated information support which will increase leadership's effectiveness in both training and operational environments.

The analysis of squadron requirements points out very clearly that currently approved Naval Aviation MIS developments which do include planned support for VP Squadrons are primarily concerned only with maintenance functions. They will not satisfy the operational, training, and administrative requirements of an individual squadron.

Initiatives that will satisfy squadron requirements do exist. Offspring of ATSS, initially developed by NAVWPNCEN, could completely satisfy community needs. The Portable Logistics System, enhanced with Automated Training Support System software modules (Mini-ATSS), conceptually appears to be the most feasible alternative available to the community.

When compared in terms of life-cycle costs with the alternative of a new developmental effort, Mini-ATSS is much more cost-effective. This is primarily due to the software development costs that could be forgone.

Hardware costs can be put in perspective with an illustration of their comparibility to other squadron expenditures. Proposed PLS hardware, which would more than satisfy Mini-ATSS requirements, has a current purchase cost of less than $23,000. In comparison, each squadron owns 18 HF radios that cost approximately $93,000 each, but fail frequently. More significantly, P-3 flight hour costs are currently over $1000 per hour just for fuel and lubricants. With an average daily flight schedule of approximately 25 hours, Mini-ATSS could be acquired for less than one day's fuel requirement. The management efficiency and operational control gained from the implementation of an automated MIS would, however, prove far more valuable than a single day's flight hour allocation, ultimately saving the squadron a significant amount of time and money.

The regulatory environment surrounding ADP acquisition will, in all estimation, dictate the availability and acquisition strategy used in pursuing this alternative. Due to this situation, strong support from community leadership is required to bring about changes in perception and regulation.

It is recommended that the Patrol Aviation Community make a stronger commitment, both politically and monetarily, to automation of squadron operational, training, maintenance, and administrative management.

It is critical that community leadership receive more and better education with respect to capabilities available through the use of automated management information systems.

Further study should be directed toward an acquisition strategy that will provide the most cost-effective solution to meet the squadron information requirements developed in this thesis.

These actions are essential to the further improvement of squadron performance, efficiency, and readiness, and will ultimately bear significantly on Patrol Aviation's continued contribution to national defense.

INPUT TITLE: Naval Aircraft Flight Record

BASIS FOR REQUIREMENT: Accumulate flight activity data for aircraft and aircrew (OPNAVINST 3710.7 Series)

INPUT EVENT: Completion of a flight in a Naval aircraft

SOURCE BASE: Naval Aircraft Flight Record (OPNAV 3700/2) prepared by flight crews upon completion of flight in a Naval aircraft

SECURITY CLASSIFICATION: Unclassified

DISPOSITION AFTER PROCESSING: Source document and storage. IFARS.

INPUT CONTROLS: None

DESIRED/REQUIRED SEQUENCE FOR PROCESSING: Cumulate all records for day prior to updating A/C records

AVERAGE NUMBER OF INPUT DATA FIELDS PER UNIT TRANSACTION: 76

TYPE OF PROCESSING: Information storage, data processing

ORIGIN	FLOW & DESTINATION FOR PROCESSING	SOURCE DATA MEDIA	FREQUENCY	AVG. NO. TRANS.	TIMELINESS
Aircrew	SQD (Maintenance)	Form	Daily	4.5/day average	Daily prior to flight accumulation update of A/C records

INPUT DESCRIPTION

INPUT TITLE: Technical Directive

BASIS FOR REQUIREMENT: Defines the specific equipment affected by an engineering change (NAVAIRINST 13050.3 Series)

INPUT EVENT: Issue of a Technical Directive

SOURCE BASE: Technical Directive issued by NAVAIR

SECURITY CLASSIFICATION: Unclassified

DISPOSITION AFTER PROCESSING: Hardcopy source file

INPUT CONTROLS: None

DESIRED/REQUIRED SEQUENCE FOR PROCESSING: None specified

AVERAGE NUMBER OF INPUT DATA FIELDS PER UNIT TRANSACTION: 34

TYPE OF PROCESSING: information storage

ORIGIN	FLOW & DESTINATION FOR PROCESSING	SOURCE DATA MEDIA	FREQUENCY	AVG. NO. TRANS.	TIMELINESS
Wing	Configuration Managers	Report-Keyboard Terminal	Monthly	0-9 range 4.5 avg.	As issued

INPUT DESCRIPTION

INPUT TITLE: Maintenance Actions

BASIS FOR REQUIREMENT: Indicate component changes in aircraft and other aircraft repair activity (OPNAVINST 4790.2 Series)

INPUT EVENT: Aircraft component or configuration change

SOURCE BASE: VIDS/MAF (OPNAV 4790/59)

SECURITY CLASSIFICATION: Unclassified

DISPOSITION AFTER PROCESSING: Submission to the Maintenance Data Collection System (MDCS)

INPUT CONTROLS: The input must be a component removal, replacement, or configuration change

DESIRED/REQUIRED SEQUENCE FOR PROCESSING: Component removals must be entered prior to replacements when applicable

AVERAGE NUMBER OF INPUT DATA FIELDS PER UNIT TRANSACTION: 12

TYPE OF PROCESSING: Data Processing

ORIGIN	FLOW & DESTINATION FOR PROCESSING	SOURCE DATA MEDIA	FREQUENCY	AVG. NO. TRANS.	TIMELINESS
Aircrew	Maintenance Control	Form	Daily	24	Upon receipt
Work Centers	Maintenance Control	Form			
Maint. Control	Maintenance Control	Form			

INPUT DESCRIPTION

INPUT TITLE: X-Ray

BASIS FOR REQUIREMENT: Informs up-line managers of aircraft status changes (OPNAVINST 5442.2)

INPUT EVENT: Aircraft status change

SOURCE BASE: Non-specific

SECURITY CLASSIFICATION: Unclassified

DISPOSITION AFTER PROCESSING: Delivered to Communications

INPUT CONTROLS: Not applicable

DESIRED/REQUIRED SEQUENCE FOR PROCESSING: None specified

AVERAGE NUMBER OF INPUT DATA FIELDS PER UNIT TRANSACTION: 30

TYPE OF PROCESSING: Data processing, report generation

ORIGIN	FLOW & DESTINATION FOR PROCESSING	SOURCE DATA MEDIA	FREQUENCY	AVG. NO. TRANS.	TIMELINESS
Maint. Admin.	Maintenance Admin.	Form	2-3/week plus special X-Rays	2	N/A

INPUT DESCRIPTION

INPUT TITLE: Engine Transaction Report (ETR)

BASIS FOR REQUIREMENT: Upline reporting of engine status (OPNAVINST 13700.3 Series)

INPUT EVENT: Engine status change, removal, replacement

SOURCE BASE: VIDS/MAF

SECURITY CLASSIFICATION: Unclassified

DISPOSITION AFTER PROCESSING: Delivered to Communications

INPUT CONTROLS: N/A

DESIRED/REQUIRED SEQUENCE FOR PROCESSING: None specified

AVERAGE NUMBER OF INPUT DATA FIELDS PER UNIT TRANSACTION: 23

TYPE OF PROCESSING: Data processing, report generation

ORIGIN	FLOW & DESTINATION FOR PROCESSING	SOURCE DATA MEDIA	FREQUENCY	AVG. NO. TRANS.	TIMELINESS
Maint. Admin.	Maintenance Admin.	Form	2-4/week	6	N/A

INPUT DESCRIPTION

INPUT TITLE: Periodic Maintenance Information Cards

BASIS FOR REQUIREMENT: OPNAVINST 4790.2 Series

INPUT EVENT: Changes to PMIC

SOURCE BASE: PMIC 01-XXX AA-6

SECURITY CLASSIFICATION: Unclassified

DISPOSITION AFTER PROCESSING: None

INPUT CONTROLS: None

DESIRED/REQUIRED SEQUENCE FOR PROCESSING: None

AVERAGE NUMBER OF INPUT DATA FIELDS PER UNIT TRANSACTION: Unknown

TYPE OF PROCESSING: Information storage

ORIGIN	FLOW & DESTINATION FOR PROCESSING	SOURCE DATA MEDIA	FREQUENCY	AVG. NO. TRANS.	TIMELINESS
Maint. Admin.	Maintenance Admin.	Report	As occurring		

INPUT DESCRIPTION

INPUT TITLE: Personnel Forms

BASIS FOR REQUIREMENT: Internal personnel management and external reporting

INPUT EVENT: Personal data transaction

SOURCE BASE: NAVPERS 1070/600 Enlisted Service Record

SECURITY CLASSIFICATION: Unclassified

DISPOSITION AFTER PROCESSING: Insertion in personnel file and forward to NMPC as required

INPUT CONTROLS: As required by SECNAVINST 5211.5B

DESIRED/REQUIRED SEQUENCE FOR PROCESSING: As occurring

AVERAGE NUMBER OF INPUT DATA FIELDS PER UNIT TRANSACTION: 6

TYPE OF PROCESSING: Information storage

ORIGIN	FLOW & DESTINATION FOR PROCESSING	SOURCE DATA MEDIA	FREQUENCY	AVG. NO. TRANS.	TIMELINESS
Service member	Squadron Personnel Office	Forms	Daily	40	Upon receipt

INPUT DESCRIPTION

INPUT TITLE: Aircrew Debrief Form

BASIS FOR REQUIREMENT: Track training, quals, system utilization, etc. accomplished on flights

INPUT EVENT: Aircraft flight

SOURCE BASE: Aircrew debrief form as filed by aircrew

SECURITY CLASSIFICATION: Unclassified

DISPOSITION AFTER PROCESSING: Hard copy source file

INPUT CONTROLS: None

DESIRED/REQUIRED SEQUENCE FOR PROCESSING: In order of occurrence

AVERAGE NUMBER OF INPUT DATA FIELDS PER UNIT TRANSACTION: 60

TYPE OF PROCESSING: Information storage, report generation

ORIGIN	FLOW & DESTINATION FOR PROCESSING	SOURCE DATA MEDIA	FREQUENCY	AVG. NO. TRANS.	TIMELINESS
Aircrew	Duty Office, Ops, Training, Tactics	Flight debrief form	Daily	4.5 from flights plus 2 from training	Day of occurrence

INPUT DESCRIPTION

OUTPUT TITLE: Technical Directive Catalog

OUTPUT DESCRIPTION: Summarizes technical directive applicability and description

OUTPUT EVENT: As required, monthly review of technical directives

SECURITY CLASSIFICATION: Unclassified

OUTPUT INTERFACE CONSTRAINTS: N/A

STORAGE/FILING CONSTRAINTS: N/A

OUTPUT CONTROL: N/A

AVERAGE NUMBER OF CHARACTERS PER DISPLAY UNIT: 2-4 pages or approximately 1020

TYPE OF PROCESSING: Query, report generation

ORIGIN	DESTINATION	MEDIA	FREQUENCY	AVG.NO. OF OUTPUT DISPLAY UNITS/COPY	NO.COPIES	TIMELINESS
Maint. Control	Maint. Control Supervisor	CRT	5/week	1	4	15 sec. CRT display
		Hard copy	Monthly	500	4	3 hours for hard copy

OUTPUT DESCRIPTION

OUTPUT TITLE: Technical Directive Incorporation Status

OUTPUT DESCRIPTION: Summarizes the ststus of each technical directive for squadron or wing aircraft

OUTPUT EVENT: As necessary to review technical directive incorporation status

SECURITY CLASSIFICATION: Unclassified

OUTPUT INTERFACE CONSTRAINTS: N/A

STORAGE/FILING CONSTRAINTS: N/A

OUTPUT CONTROL: N/A

AVERAGE NUMBER OF CHARACTERS PER DISPLAY UNIT: 200

TYPE OF PROCESSING: Query

ORIGIN	DESTINATION	MEDIA	FREQUENCY	AVG.NO. OF OUTPUT DISPLAY UNITS/COPY	NO.COPIES	TIMELINESS
Maint. Admin.	Maint. Control Supervisor	CRT or hard copy	Weekly	20	4	30 sec CRT
Wing Maint.	Wing Maint. Supervisor	CRT or hard copy	Weekly	50	4	30 sec CRT

OUTPUT DESCRIPTION

OUTPUT TITLE:	X-Ray Message Report
OUTPUT DESCRIPTION:	Reports aircraft status change to up-line management (OPNAV 5442-1)
OUTPUT EVENT:	Change in aircraft status
SECURITY CLASSIFICATION:	Unclassified
OUTPUT INTERFACE CONSTRAINTS:	N/A
STORAGE/FILING CONSTRAINTS:	Data stored in applicable aircraft record
OUTPUT CONTROL:	N/A
AVERAGE NUMBER OF CHARACTERS PER DISPLAY UNIT:	400
TYPE OF PROCESSING:	Report generation

ORIGIN	DESTINATION	MEDIA	FREQUENCY	AVG.NO. OF OUTPUT DISPLAY UNITS/COPY	NO.COPIES	TIMELINESS
Maint. Admin.	Maint. Control Supervisor	Message hard copy	3 weekly plus special	1	1	15 min.

OUTPUT DESCRIPTION

OUTPUT TITLE: End of Quarter (EOQ) Report

OUTPUT DESCRIPTION: Summarizes operating hours

OUTPUT EVENT: End of quarter up-line reporting (NAVAIR 13700-2)

SECURITY CLASSIFICATION: Unclassified

OUTPUT INTERFACE CONSTRAINTS: N/A

STORAGE/FILING CONSTRAINTS: N/A

OUTPUT CONTROL: N/A

AVERAGE NUMBER OF CHARACTERS PER DISPLAY UNIT: 850

TYPE OF PROCESSING: Report generation

ORIGIN	DESTINATION	MEDIA	FREQUENCY	AVG.NO. OF OUTPUT DISPLAY UNITS/COPY	NO.COPIES	TIMELINESS
Maint. Admin.	Maint. Control Supervisor	Hard copy	Quarterly	1	1	15 min.

OUTPUT DESCRIPTION

OUTPUT TITLE: Engine Transaction Report (ETR)

OUTPUT DESCRIPTION: Reports on engine removals and installations to up-line management (NAVAIR 13700-2)

OUTPUT EVENT: Engine removal or installation keyed to VIDS/MAF

SECURITY CLASSIFICATION: Unclassified

OUTPUT INTERFACE CONSTRAINTS: N/A

STORAGE/FILING CONSTRAINTS: Data stored in applicable engine record

OUTPUT CONTROL: N/A

AVERAGE NUMBER OF CHARACTERS PER DISPLAY UNIT: 650

TYPE OF PROCESSING: Report generation

ORIGIN	DESTINATION	MEDIA	FREQUENCY	AVG.NO. OF OUTPUT DISPLAY UNITS/COPY	NO.COPIES	TIMELINESS
Maint.	Maint. Control	Message	3/monthly	1	1	15 min.

OUTPUT DESCRIPTION

OUTPUT TITLE: Aircraft Accounting Audit Report

OUTPUT DESCRIPTION: Summarizes aircraft status for up-line management

OUTPUT EVENT: End-of-month report (OPNAV Report 5442-6)

SECURITY CLASSIFICATION: Unclassified

OUTPUT INTERFACE CONSTRAINTS: N/A

STORAGE/FILING CONSTRAINTS: N/A

OUTPUT CONTROL: N/A

AVERAGE NUMBER OF CHARACTERS PER DISPLAY UNIT: 700

TYPE OF PROCESSING: Report generation

ORIGIN	DESTINATION	MEDIA	FREQUENCY	AVG.NO. OF OUTPUT DISPLAY UNITS/COPY	NO.COPIES	TIMELINESS
Maint. Admin.	Maint. Control Supervisor	Hard copy	Monthly	1	1	15 min.

OUTPUT DESCRIPTION

OUTPUT TITLE: Record 'A' Report

OUTPUT DESCRIPTION: Summarizes aircraft flight data

OUTPUT EVENT: End-of-month squadron report

SECURITY CLASSIFICATION: Unclassified

OUTPUT INTERFACE CONSTRAINTS: N/A

STORAGE/FILING CONSTRAINTS: N/A

OUTPUT CONTROL: N/A

AVERAGE NUMBER OF CHARACTERS PER DISPLAY UNIT: 480

TYPE OF PROCESSING: Report generation

ORIGIN	DESTINATION	MEDIA	FREQUENCY	AVG.NO. OF OUTPUT DISPLAY UNITS/COPY	NO.COPIES	TIMELINESS
Maint. Admin.	Maint. Control Supervisor	Hard copy	Monthly	1	1	15 min.

OUTPUT DESCRIPTION

OUTPUT TITLE: Daily Material Control Validation/Daily Flight Time Report

OUTPUT DESCRIPTION: Tabulates flight time of aircraft and engines

OUTPUT EVENT: Generated daily at the start of work day

SECURITY CLASSIFICATION: Unclassified

OUTPUT INTERFACE CONSTRAINTS: N/A

STORAGE/FILING CONSTRAINTS: N/A

OUTPUT CONTROL: N/A

AVERAGE NUMBER OF CHARACTERS PER DISPLAY UNIT: 800

TYPE OF PROCESSING: Report generation

ORIGIN	DESTINATION	MEDIA	FREQUENCY	AVG.NO. OF OUTPUT DISPLAY UNITS/COPY	NO.COPIES	TIMELINESS
Maint. Admin.	Maint. Control Supervisor	Hard copy	Daily	1	1	15 min.

OUTPUT DESCRIPTION

OUTPUT TITLE: Personnel Summaries (Training Plans and Maintenance Plan)

OUTPUT DESCRIPTION: Various personnel management reports

OUTPUT EVENT: Daily, weekly, and monthly reporting requirements

SECURITY CLASSIFICATION: Unclassified

OUTPUT INTERFACE CONSTRAINTS: None

STORAGE/FILING CONSTRAINTS: None

OUTPUT CONTROL: None

AVERAGE NUMBER OF CHARACTERS PER DISPLAY UNIT: 2500

TYPE OF PROCESSING: Report generation

ORIGIN	DESTINATION	MEDIA	FREQUENCY	AVG.NO. OF OUTPUT DISPLAY UNITS/COPY	NO.COPIES	TIMELINESS
Training	CO	Hd copy	Daily, weekly, monthly	20	80	2 hours
Maint.	CO	Hd copy	Daily, weekly,	20	50	2 hours

OUTPUT DESCRIPTION

OUTPUT TITLE: Aircrew Training Status

OUTPUT DESCRIPTION: Describes training status for individual aircrewmen and aircrews

OUTPUT EVENT: Daily and weekly training schedules

SECURITY CLASSIFICATION: Unclassified

OUTPUT INTERFACE CONSTRAINTS: None

STORAGE/FILING CONSTRAINTS: None

OUTPUT CONTROL: None

AVERAGE NUMBER OF CHARACTERS PER DISPLAY UNIT: 3000

TYPE OF PROCESSING: Report generation

ORIGIN	DESTINATION	MEDIA	FREQUENCY	AVG.NO. OF OUTPUT DISPLAY UNITS/COPY	NO.COPIES	TIMELINESS
Training	Schedules, Operations, CO	Hd copy	Weekly	4	25	1 hour
		CRT	Daily	partial	1	15 seconds

OUTPUT DESCRIPTION

DATA TITLE:	Technical Directive Catalog
DATA DESCRIPTION:	Summarizes significant data contained in tech. directive source documents. Specifically it describes the status and effectivity of each technical directive issued for each type aircraft, engine, and aeronautical equipment.
FUNCTIONAL USE:	Monitor the applicability of changes to assigned equipment
CURRENT/HISTORICAL:	Current
TYPE PROCESSING:	Query, report generation
RETENTION/BACKUP:	Squadron data backup at functional Wing
SECURITY CLASSIFICATION:	Unclassified
FREQUENCY OF USE:	Daily for selected records
AVERAGE NUMBER OF DATA FIELDS:	34/record;
ESTIMATED GROWTH RATE:	Included in average number
UPDATE FREQUENCY:	None required after individual records are entered

RETAINED DATA DESCRIPTION

DATA TITLE:	Aircraft ID and Status
DATA DESCRIPTION:	Describes the status of assigned aircraft. Contains X-Ray data, flight data, and Maintenance planning data.
FUNCTIONAL USE:	Monitor aircraft status
CURRENT/HISTORICAL:	Current
TYPE PROCESSING:	*Query, update, computational, report generation*
RETENTION/BACKUP:	Squadron data backup at Wing and in Aircraft Logbook
SECURITY CLASSIFICATION:	Unclassified
FREQUENCY OF USE:	Daily
AVERAGE NUMBER OF DATA FIELDS:	90/record. Number of records vary depending on number of aircraft assigned. Presently all VP squadrons have 9.
ESTIMATED GROWTH RATE:	N/A
UPDATE FREQUENCY:	Daily

RETAINED DATA DESCRIPTION

DATA TITLE:	Engine ID and Status
DATA DESCRIPTION:	Describes the status of assigned aircraft. Contains ETR data, flight data, and Maintenance planning data.
FUNCTIONAL USE:	Monitor the status of each engine
CURRENT/HISTORICAL:	Current
TYPE PROCESSING:	Query, update, computational, report generation
RETENTION/BACKUP:	Squadron data backup at Wing and engine logbook
SECURITY CLASSIFICATION:	Unclassified
FREQUENCY OF USE:	Daily
AVERAGE NUMBER OF DATA FIELDS:	55/record
ESTIMATED GROWTH RATE:	N/A
UPDATE FREQUENCY:	Daily

RETAINED DATA DESCRIPTION

DATA TITLE:	Configured Item Status
DATA DESCRIPTION:	Contains status of each serialized component
FUNCTIONAL USE:	Identifies configuration impacts and removal schedules to the maintenance managers
CURRENT/HISTORICAL:	Current
TYPE PROCESSING:	Query, report generation, computational
RETENTION/BACKUP:	Squadron data backup at Wing
SECURITY CLASSIFICATION:	Unclassified
FREQUENCY OF USE:	Daily for selected records
AVERAGE NUMBER OF DATA FIELDS:	10/record
ESTIMATED GROWTH RATE:	Included in average number
UPDATE FREQUENCY:	Daily

RETAINED DATA DESCRIPTION

DATA TITLE:	Personnel File
DATA DESCRIPTION:	Personnel profile for each person assigned to the squadron
FUNCTIONAL USE:	Assists managers in preparing personnel lists, qualifications, training, schools, and advancement requirements and status.
CURRENT/HISTORICAL:	Current
TYPE PROCESSING:	Query, report generation
RETENTION/BACKUP:	Squadron data backup at Wing and hard copy personnel file
SECURITY CLASSIFICATION:	Unclassified, Privacy Act
FREQUENCY OF USE:	Daily
AVERAGE NUMBER OF DATA FIELDS:	375
ESTIMATED GROWTH RATE:	Included in average number
UPDATE FREQUENCY:	As required

RETAINED DATA DESCRIPTION

DATA TITLE:	Flight Activity
DATA DESCRIPTION:	Record of individual flights
FUNCTIONAL USE:	Maintain flight time data for aircraft and aircrew records
CURRENT/HISTORICAL:	Historical
TYPE PROCESSING:	information storage
RETENTION/BACKUP:	Yellow sheets retained for one year
SECURITY CLASSIFICATION:	Unclassified
FREQUENCY OF USE:	Daily
AVERAGE NUMBER OF DATA FIELDS:	84 for each record
ESTIMATED GROWTH RATE:	N/A
UPDATE FREQUENCY:	Daily

RETAINED DATA DESCRIPTION

DATA TITLE:	Aircrew Training Records
DATA DESCRIPTION:	Summarize individual aircrew training requirements and completions
FUNCTIONAL USE:	Monitor aircrew training task objectives
CURRENT/HISTORICAL:	Current
TYPE PROCESSING:	Query, report generation
RETENTION/BACKUP:	Hard copy summary in individual training jackets, backup at Wing
SECURITY CLASSIFICATION:	Unclassified, Privacy Act
FREQUENCY OF USE:	Daily
AVERAGE NUMBER OF DATA FIELDS:	300
ESTIMATED GROWTH RATE:	Included in average
UPDATE FREQUENCY:	Daily

RETAINED DATA DESCRIPTION

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